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Communications-Electronics-Photography

Journal of the Armed Forces Communications Association

VOLUME 6 NOVEMBER-DECEMBER 1951 NUMBER 2

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SIGNAL is published bi-monthly by the Armed Forces Communications Association at 1624 Eye St., N. W., Washington 6, D. C. Entered as second-class matter at Post Office, Washington, D. C., September 6, 1946, under Act of March 3, 1879. Additional entry at Baltimore, Md.

Subscription rates: 1 year (6 issues), $5.00. To foreign post offices, $6.00.

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Printed in U.S.A. by Monumental Printing Co. at Baltimore, Md.

The publisher assumes no responsibility for return of unsolicited manuscripts or art. Authors are responsible for opinions expressed in articles.

When sending change of address, please list both the old and new addresses, and allow 3 weeks for delivery of first copy.

CONTENTS

FEATURES

A New Essential for Victory at Sea 9

Harbor Radar 14

Amateur Radio and the National Emergency 15

"One If By Land" 18

Project 3A-68-51 20

World's Biggest Little Airline 22

Electron Tube Reliability 24

Glenn L. Martin 27

Leich 31

DuMont 33

DEPARTMENTS

President's Page 36

Association Affairs 37

AFCA Directors and Officers 37

AFCA Industry Group Members 38

Chapter News 40

Chapters and Officers 42

News 54

Books and Services 78

Index to Advertisers 79

COVER

Season's Greetings from AFCA!

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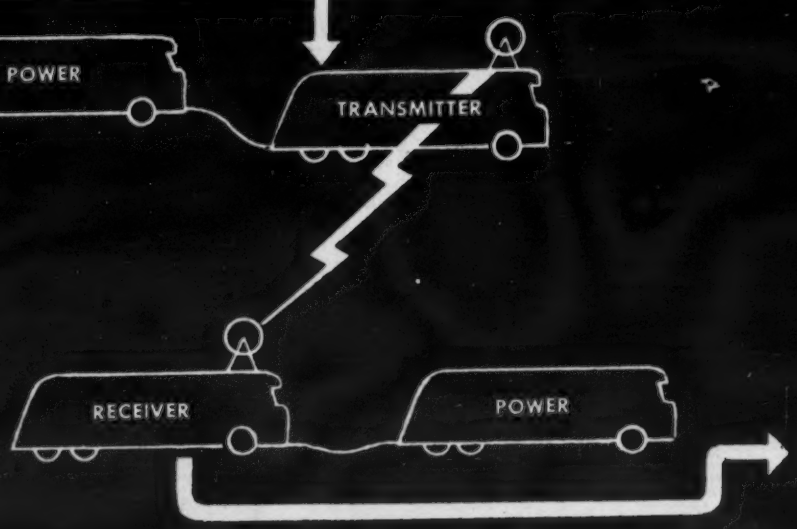
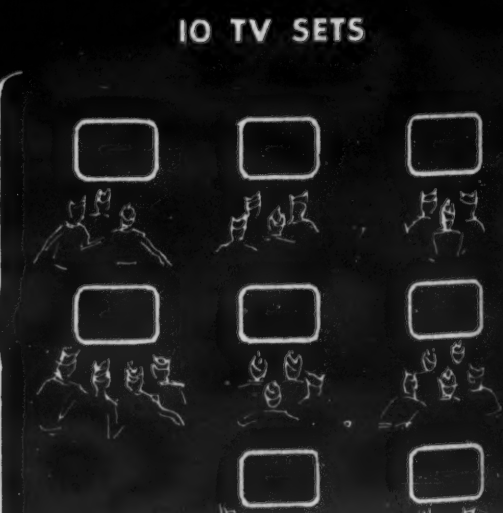
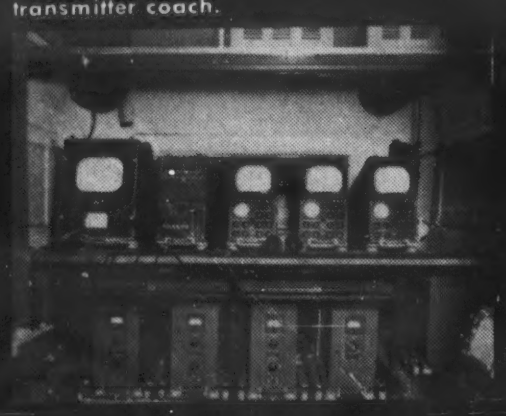
Television on W

View of high-fidelity tape recorder in transmitter coach.



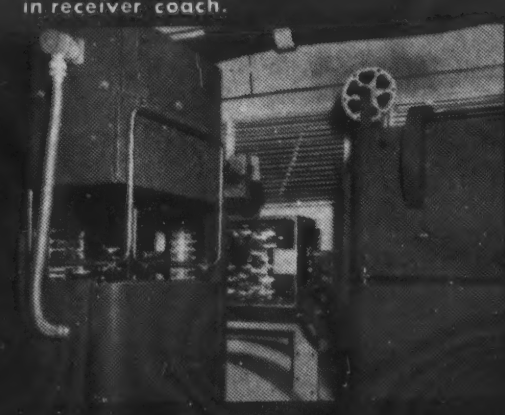


Camera monitoring position in transmitter coach.



TV amplifiers and power supplies in receiver coach.

TV film camera and projector in receiver coach.



—new "electronic eyes" for the Army

THIS fast-moving mobile television system recently delivered by RCA to the U.S. Army Signal Corps flashes eyewitness views of intricate field exercises to expert observers, maneuver umpires, or to Army classrooms.

Pioneering a new concept in military instructional techniques—a major advancement for on-the-spot coverage in military observation and communication—exploring the feasibility of TV for field instruction and tactical use are a few of the jobs assigned to this equipment.

This new mobile TV system is the most complete television station ever mounted on wheels. It consists of four 10-ton coach-trucks fitted with custom-built bodies, each 31 feet long.

THE FIRST COACH contains the cameras and transmitter units . . . three complete TV field camera chains . . . microwave transmitter for video signals . . . 45-watt FM transmitter for sound signals . . . four microphone inputs . . . tape and disc recording equipment . . . complete TV monitoring and switching control equipment.

Transmitter power supply equipment, consisting of two powerful 15-KVA gas-driven generating units is contained in the SECOND COACH.

The receiver-display unit forms the THIRD COACH. This unit houses the FM and microwave receiving equipment . . . ten 16-inch TV picture monitors . . . a 16mm TV projector and film camera . . . slide projector . . . and a large-screen TV projector.

Housed in the FOURTH COACH is another 15-KVA generator power supply for the receiver-display unit. All coaches in the system are in communication with one another by means of an RCA 15-watt Carfone two-way radiotelephone.

This mobile television system, built for the U.S. Army Signal Corps, is another example of RCA applied engineering, manufacturing and service activities. RCA, through its extensive facilities, is constantly striving to provide our armed forces on land, sea and in the air with better military equipment.

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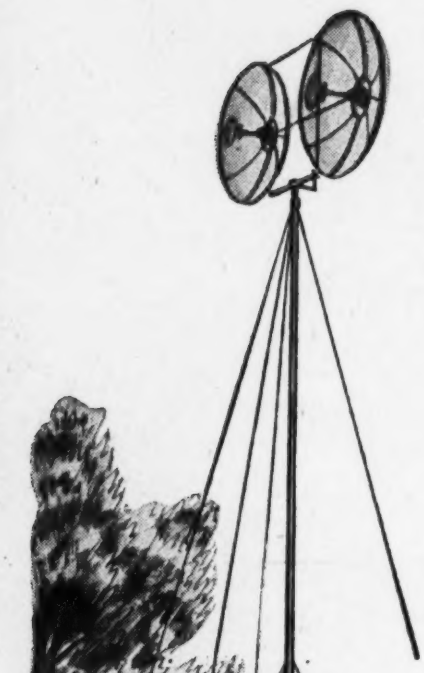

As every signalman knows, no field problem can match —for headaches—the job of playing nursemaid to ground wire. Pounded by trucks and tanks, ripped by bulldozers, and shattered by artillery, signal cable is also target "A" for enemy patrols and saboteurs. Keeping tactical communications open has always been costly in manpower, materiel, and transportation.

Working with Signal Corps engineers, General Electric has improved upon basic microwave designs to combine the best features of many. The new ANTRAC 26* is a radio transmitter—receiver and multiplex unit providing eight 2-way voice channels. Built for fixed or truck mounting, it is compact, durable, capable of operating in any weather, over any terrain. Designed as a connecting link in a communication network where laying wire is not feasible, this unit embodies the microwave point-to-point line-of-sight principle. It is one of many new military developments from Electronics Park where microwave systems are a specialty. Here, in the electronics capital of the world, General Electric's aim is to replace muscle with machinery—to make electronics provide us with a vital edge of superiority.

*AN/TRC-26

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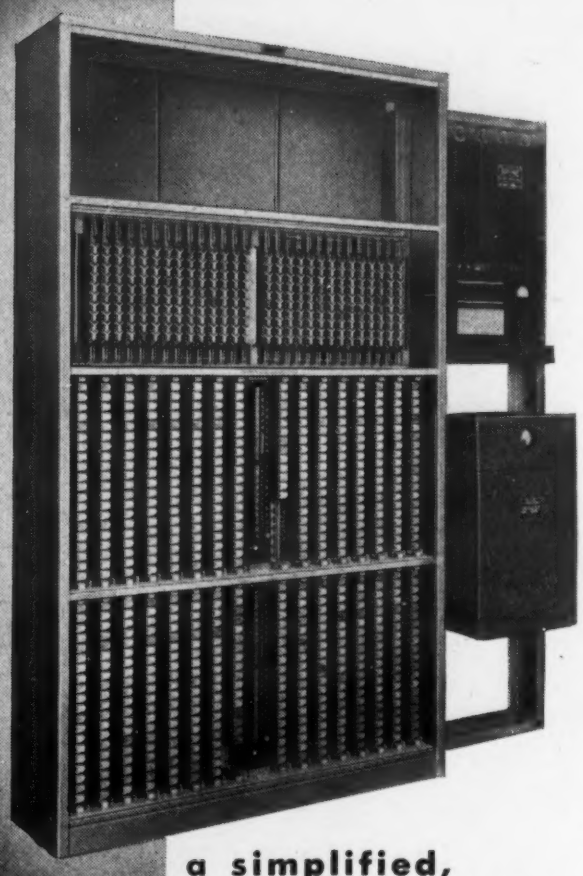


the Leich dial system

a simplified, more dependable and flexible relay type dial switchboard

When we first introduced the Leich Dial System, the most enthusiastic comments came from people with long experience in the operation of dial apparatus.

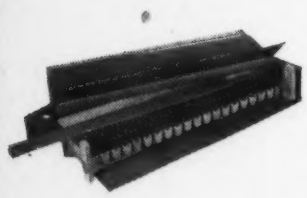
They could plainly see the advantages the Leich Dial System offered because of their first-hand knowledge of the then available switching equipment.

The simplicity, the unique construction that eliminated thousands of soldering joints, that made the Leich Dial System easy to understand and operate, appealed to them. When they discovered that lines and links could be added quickly and inexpensively by their own men, with no factory installers necessary, they agreed we had the answer to their prayers for a more sensible dial switchboard.

The panel below tells how simple and easy it is to add to the Leich Dial System. A 20 page illustrated catalog gives more complete information. Write for it.

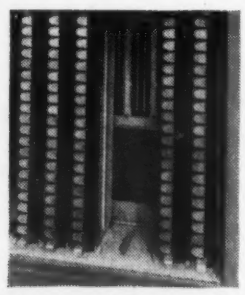
How you can add ten lines to the Leich Dial System in ten minutes.

1



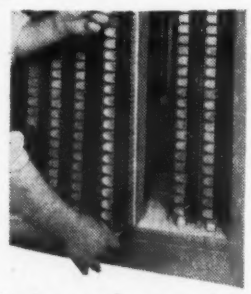
Single, jack-in relay bars contain the line and cut-off relays for each group of ten lines. These are carried in stock — wired, tested, ready to install.

2

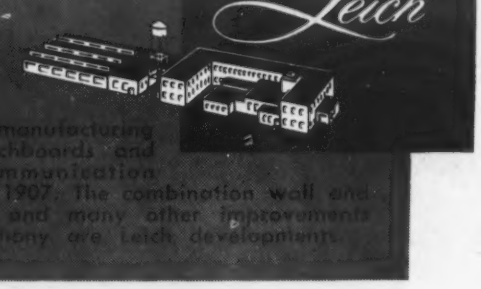


This shows where the line relay bars are jacked-in. Every switch-board is fully wired and contains the jacks for plugging-in these 10-line relay bars up to full capacity.

3



All that's necessary is to jack-in the relay bar units as shown here. Each relay bar jacked-in adds 10 lines to the switch-board.



Leich has been manufacturing telephones, switchboards and associated communication equipment since 1907. The combination wall and desk telephone, and many other improvements in modern telephony are Leich developments.

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A SERVICE OF RADIO CORPORATION OF AMERICA

The requirement for a more widespread knowldge of electronics in the Navy, and a greater appreciation of its importance, comprises

A New Essential For Victory At Sea

By Lt. G. P. Steele II., USN

Is the Navy being as slow to fully adopt electronics as it was steam? In 1807 Robert Fulton proved that the steamboat was practicable. In 1907 Lee DeForrest patented the first vacuum tube. Both events were of revolutionary significance to the United States Navy. Both events were slow to make their effect felt in the service. Still, have we been more receptive to new ideas in our century than our great-grandfathers were in theirs?

In 1850 you could walk aboard any ship of the Navy and get it underway without a flicker of the steam pressure gauge. Commanding officers had been brought up in the age of sail which stretched back to the earliest history of mankind. Many barely tolerated the dirty, cranky steam engines that soiled the holy-stoned topside with a layer of soot and cinders. Few took the trouble to learn the intricacies of the new infernal machinery. The old sea dogs didn't want to learn any new tricks—and so they had started the Engineer Corps in 1836. About the middle of the 19th Century "many distinguished officers wagged their heads wisely at the sight of steam ships of war and predicted that they would never withstand the shock and fire of battle."[1] In 1850 steam was on the scene but it had by no means been fully accepted and exploited.

In 1950 our commanding officers had all been brought up in the pre-electronic age. But just as the Mexican War showed that steam had a place, so World War II had demonstrated that electronics had a place. It was a rare commanding officer that had any but the most cursory knowledge of electronics. As they were a hundred years before, officers were given special training in the new skill and assigned duty in it. Without the wisdom of yet another hundred years we may argue that our record as of 1950 was not nearly so damning as that of 1850. Today most commanding officers have learned to lean heavily on electronics, to demand more and better equipment, and to expect high performance from their electronic equipment and personnel. The Navy is pouring millions of dollars into electronic research and development as well as into the procurement of new "hardware." Interest in electronics has burgeoned as never before. But there are plenty of dark spots on our record, too.

It is a short record. Electronics in quantity has existed for the regular naval officer for the short span of only ten years. In ten years we have traveled far and fast. We have come from the day of the human eye to the day of the electronic eye; from the lookout to the radar; from the sextant to the Loran; from the visual identification signal to the electronic IFF. Our progress has been so fast that problems have not always been solved as they came up. Some have simply climbed on board and come along, growing bigger daily. The time has come to face and solve them.

Let us not fool ourselves. The performance of the Navy's electronic equipment in 1950 was not satisfactory. One fleet commander last year estimated that ten percent of his electronic equipment was always out of commission and that another fifty percent was unreliable. Altogether, sixty percent of the electronic equipment in service in that fleet was in poor condition! And despite the untiring efforts of all concerned that black picture had not been appreciably improved for the previous two years. This problem of electronic maintenance is vital and it is urgent.

As is the case with most problems, people are at the root of this one. Electronic repair personnel procurement, training, distribution, and direction is a large part of it. Equipment design and procurement is another large part. The design and procurement of the electronic components, the resistors and the tubes, and the other myriad of complex items, is yet another. But above all, the education of the service as a whole in electronics is essential to a happy resolution of our difficulties. The Navy in general looks at electronics much as a woman looks at her automobile. She knows how to run it but hasn't the slightest idea what is under the hood—*and doesn't care.* She likes it big and shiny and with lots of gadgets. If it won't run she takes it to the shop with a grimace and a sigh. If we are going to beat this thing we have all got to understand basically what is under the hood. We have all got to know at least as much about electronics as we do about steam engineering plants, gunnery, and seamanship.

Of course, we could leave it to the specialists as they tried to do with steam in 1836. On this subject the Secretary of the Navy said in his Annual Report of 1864, "Objection may be given that the duties (of line and engineer officer) are dissimilar and that steam-engine driving is a specialty. The duties are not more dissimilar than seamanship and gunnery. When seamanship was the only education given to an officer, it was not believed he could ever teach sailors to drill, and a sergeant of marines performed the duty which is now so admirably discharged

A 1944 graduate of the U. S. Naval Academy, the author served in submarines during World War II, making two war patrols in the Southwest Pacific Area in the USS *Becuna.* He served as a submarine electronics officer, as well as in all other departments, for a total of about three years. He attended the electronics materiel school, Treasure Island, California, was electronics officer, staff, commander Submarine Squadron Eight from 1950 to 1951, and is at present an instructor at the Submarine School, New London, Conn. We extend our appreciation to Lt. Steele for the use of this article, and to the American Society of Naval Engineers in whose journal the article originally appeared. While we feel that Lt. Steele has expressed his views in highly readable fashion it must be pointed out that the opinions or assertions contained in this article are the private ones of the writer and are not to be construed as official, or reflecting the views of the Navy Department, the Naval service at large, or the AFCA, publishers of SIGNAL.

[1]The Monitor and the Navy Under Steam—E. M. Bennett, Houghton, Mifflin & Co., 1900.

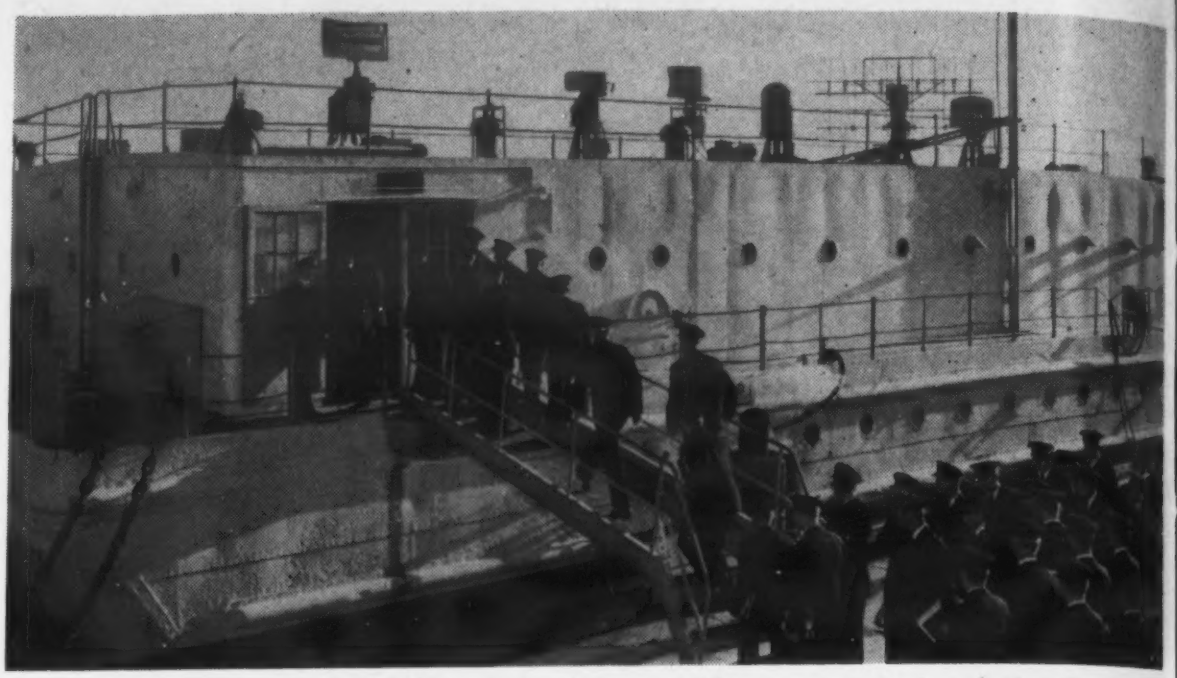
by the graduates of the Naval Academy. When gunnery became a specialty it was inconsiderately and unwisely proposed to have a corps of ordnance officers engrafted upon the naval service, a separate organization, which should draw to itself the knowledge so necessary to each, and therefore proper to be distributed among all officers.

"Fortunately, our naval officers are taught seamanship, gunnery, and the infantry drill, and the service thereby saved from distinct organizations in these respects which would, inevitably, have impaired its efficiency. . . . With the adoption of the suggestions here made, we shall, in due time, have a homogeneous corps of officers, who will be masters of the motive power of their ships in the future as they have been of seamanship in the past."

Again in the Secretary of the Navy's Annual Report of 1865 we find the following advice: "The management of a man-of-war in a gale, on a lee shore, in a narrow harbor, or the splendid manoeuvres of battle by sailing vessels have hitherto been the highest and proudest duties of a thorough naval officer. The skillful disposition of the sails, which was the result of the best training of the old school, is no longer necessary, except as auxiliary to the new motive power which modern invention and science have introduced. The naval vessel is no longer dependent upon the winds, nor is she at the mercy of currents; but the motive power which propels and controls her movements is subject to the mind and will of her commander, provided he is master of his profession in the future as he has been in the past. To retain the prominence which skill and education gave him when seamanship was the most important accomplishment, the line officer must be qualified to guide and control this new element or power. *Unless he has these qualities, he will be dependent upon the knowledge and skill of him who manipulates and directs the engine.*" (Italics supplied.)

The line officer might as well learn electronics. Already electronics has invaded nearly every field in which the naval officer must be proficient. Electronics now aims guns; it drops bombs; it navigates ships; it helps control engineering plants; and it intrudes itself into the sailor's life at every turn. But one thing it cannot do itself is to provide fully qualified electronic repair personnel.

Our personnel situation in electronics was not good last year, and that is an understatement. On board ships the number of regular Navy electronic technicans had increased since 1947, but was still below authorized complement as to both numbers and rates—the Korean War prevented discharges and brought in reservists so that a great improvement was made by the year's end. nicians had increased since 1947, but It was the practice to count any striker, or seaman designated as an apprentice for a given rating, as a rated man for the purpose of personnel strength com-



Electronics learning at the U. S. Naval Academy. Midshipmen going aboard the electronics field laboratory for practical instruction in radar, sonar, and loran. "Already electronics has invaded nearly every field in which the naval officer must be proficient."

putations. Since electronic technician strikers were almost all graduates of the "class A" or basic electronic schools, there was some argument for this policy. But the inexperienced seaman graduate was not in fact the equivalent of a seasoned third class petty officer, and personnel figures to that extent were fallacious. The veteran of a year on board has been known to say, "It took me six months on board after I arrived from school before I found all of the fuses!"

Not only were units of the fleet below complement but the training of the individual electronic technician was not adequate to meet the demands upon him. Class A school was only basic and there was frequently too desperate a need for his services for him to be sent to advanced "class B" school. The training received at advanced schools, and even at basic schools, was too often more valuable to the individual than his naval career, with the rapidly expanding civilian electronic industry offering attractive jobs. Until the middle of 1950 the training cycle was broken again and again by the loss of the most experienced men. Those who remained had to carry a double load. One crisis after another came as each aging equipment in its turn broke down. Needed repairs were urgently demanded by captains who had operational commitments to meet. Thus came longer hours and more losses to civilian life of disgruntled technicians. Pity the desperate electronic technician whose basic training is not adequate to promptly cure a complex disorder in a unit of a vital equipment, and whose frustrated officers angrily demand that it be fixed immediately. Working all night he may stumble across the answer. The answer may be to get out of the Navy.

The officer situation was a little better. Sprinkled thinly in the junior grades throughout the service was an increasing number of graduates of the six-month basic officers' course at Treasure Island, California, of the year-long warrant officers' course, and of the wartime schools. Postgraduate instruction in electronics had been received by a comparative few, but the number was increasing. Nearly every ship or unit of the fleet of any size had at least one officer who had received special training in electronics.

The majority of these officers had received basic training with a lot of theory designed to fit them for the administration of electronic installations but not for detailed repair work. A considerable gap therefore existed between their training and that of their average electronic technician. This gap could be closed only by advanced training in maintenance on the part of one or the other. Custom and usage often widened the hiatus. The officer had been trained to exercise direction and not to be a physical doer except in emergency. His duty was to organize, train, lead, and not to lose lightly his capability of overall direction by concentration with his person on the individual task. So the officer might survey the scene, make a rough diagnosis, prescribe a procedure, and then leave his men to struggle, coming back to check on progress and offer encouragement and new directions when needed. The only trouble is that unless one stays with a complex repair job on an electronic equipment continuously he tends to lose the picture, particularly if his own electronic training is basic with a lot of theory. Then, too, the smaller the unit the more watches and other duties and responsibilities make it unlikely, except in emergency, that the officer can personally assume charge of repair work no matter how much he would like to do so.

"Complete With Physicist"

Both officers and men engaged in maintenance more often than not lacked familiarity with the specific equipment with which they were charged. The multitude of models of electronic equipment made the teaching of all equipments in detail during schooling impos-

sible. "Class C" schools, which teach specific equipments, were attended by a select few. Therefore, a considerable break-in period when the novice became familiar with the circuitry and characteristics of his equipment was the general rule. His instruction book, while an essential tool, was usually no effective substitute for experience. New equipment, which not infrequently was received, required a new period of study and experience to add to the normal workload. The new equipments became more complicated and difficult to repair as time passed until in 1950 informed sources in the Bureau of Ships joked that "each new radar will soon come complete with a physicist to maintain it."

In an attempt to close the gap between the theoretical background of the trained officers and the basic background of the electronic technicians, the Bureau of Ships provided the fleet with the services of numerous civilian field engineers obtained on contract from the various major electronic manufacturers. These civilian engineers were a great help. Yet conditions did not sufficiently improve with their coming. The training of the Navy technicians to help themselves was a major part of their mission, but as time passed they became more and more essential. Actual labor on deranged equipment used up much valuable time which should have been spent on instruction. The filling out of numerous reports and work sheets for their own companies often cut a half of a working day from their week. From a temporary expedient the contract field engineer was passing into the permanent living proof that the Navy had lost the ability to keep abreast of technical maintenance—that ability which had so long been its pride.

Responsible commanders in the fleet were rightfully concerned about the unsatisfactory electronic performance. They were handicapped severely, however, in their attempts to do anything effective by their own lack of knowledge of the new science and by the lack of experienced senior staff officers who were competent to advise them. For example, a typical type commander's staff had a lieutenant assigned as electronics officer. He served as an assistant to a senior commander who was an engineering duty designee. On the squadron commander level the duties of electronic officer were performed by a lieutenant (junior grade) who was the assistant to the staff engineering officer, a lieutenant commander with postgraduate engineering training. All squadron electronics in this particular type command, save one, were also communication officers, an exacting and time-consuming job. While these officers were conscientious in their efforts, their collateral duties cut heavily into their time. Vastly more important, their quite junior status and youth made their voices weak in the councils; their lack of experience devalued their wisdom.

At higher levels this lack of experienced officer persisted. On fleet staffs the electronics officer was a commander. The Bureau of Ships had recognized electronics with the creation of the electronics division headed by a senior captain, but few, if any, flag officers in the service in 1950 were well grounded in the field. Navy electronics lacked "horsepower." It lacked the emphasis and direction that officers experienced in electronics and senior enough at all levels could give it.

World War II Impetus

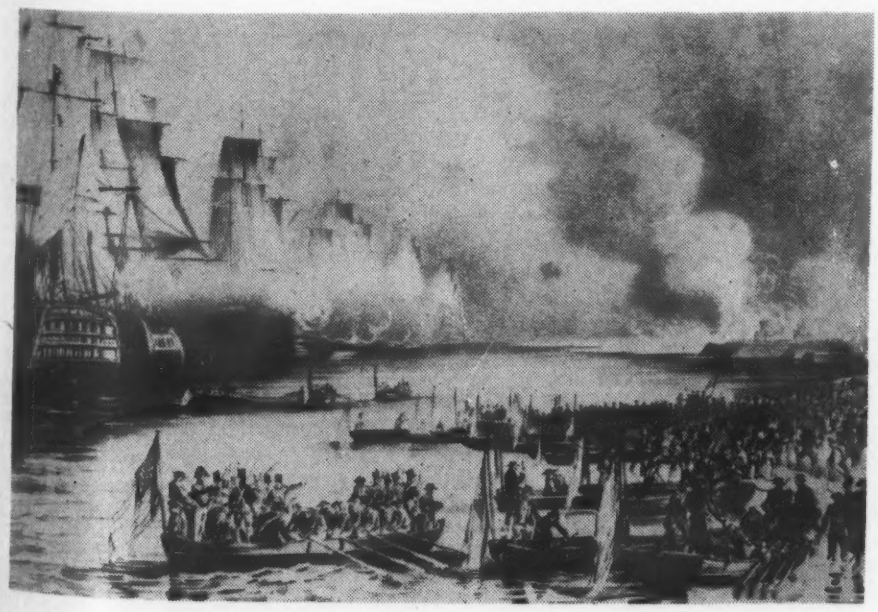
The material condition of Navy electronics at midcentury was not due to personnel deficiencies alone. The equipments themselves were no small factor. World War II made tremendous and overwhelming demands on the designers and manufacturers. Electronic devices gave our forces such an edge in battle that they quickly became an essential for victory. It was no time to indulge in a search for perfection.

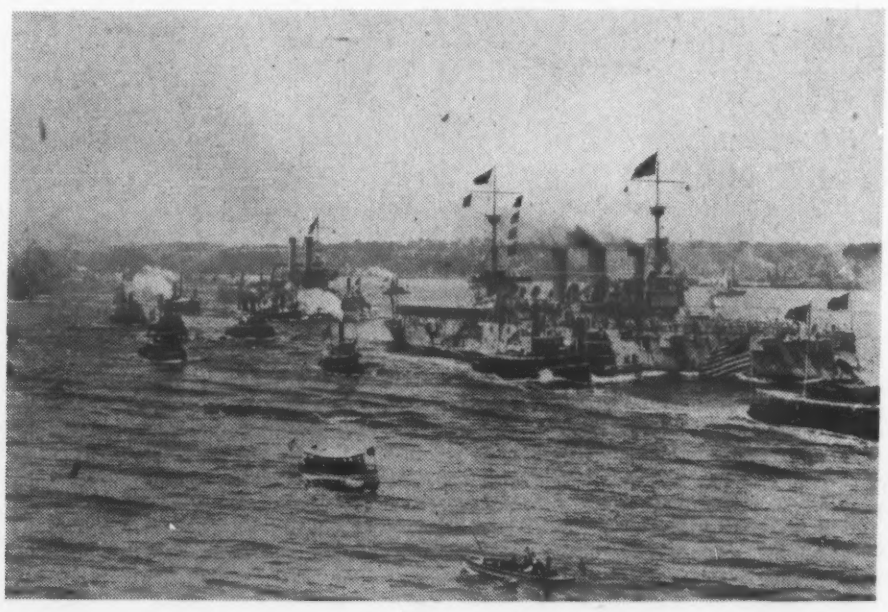
In the design of much wartime electronic equipment the manufacturer in effect wrote the specifications as he went along. Circuits were designed using, in the main, components then existing and used in contemporary civilian production. Every new vacuum tube and resistor which had to be specially designed meant the loss of precious time. Is it hard to understand, therefore, how a component which would have an adequate life in a civilian radio, or which for a short wartime career would not fail, could be inadequate in peacetime? Here is the secret of much of our difficulty. Our equipments have grown old and tired. In a piece of sonar gear having a thousand individual components time and use have developed inevitable, serious, and recurring failures which mock the technician at every turn.

There was no time in war to fully balance the conflicting needs of the repairman and the manufacturer. The sets produced were usually much harder to "trouble-shoot" than they should have been. You just cannot get at the gear to fix it without much grunting and groaning—and wasted hours. The demands for compactness from the fleet were often met at the expense of maintenance facility. There is no intent to criticize these able designers for their wartime work. As it was they worked miracles within the meager allowance of time. The fact remains that today we are still paying a heavy price for that lack of time.

The effect of the regular shipyard overhauls in the maintenance of shipboard electronic equipment was by no means completely salutary. The frequent complaint had been heard, "We went to the shipyard with all of our equipment working, but it took us three months after leaving to get all of the 'bugs' out that the yard put in." None are more acutely aware of this dissatisfaction than the shipyard electronic personnel. They know their business well. But in 1950 the full "system check-out" so dear to the heart of the shipyard electronic shop was not possible. There was no opportunity to get everything electronic, and the things electronics tied into, all ready to test at once—no time to start it all running and keep it going for four or five days *to try to make it break down* and thus elimi-

Below, left, Landing of American forces at Vera Cruz, 1847. "In 1850 you could walk aboard any ship of the Navy and get it underway without a flicker of the steam pressure guage." Right, the Navy has long since gone over to steam, as the fleet returns to New York Harbor following the Spanish-American War, has not yet entered the era of electronics.





nate future trouble. Unquestionably, electronic equipment will have "bugs" in it after it has been overhauled. With so many soldered connections, so many individual items which may be about to fail, and so many latent troubles which do not develop until after a considerable period of operation at full operating temperatures and loads, it is understandable. An electronic equipment is not like a pump. A pump can be overhauled and given a full load operating test. It works or it doesn't, and you usually know quite soon. But you cannot say that because you can turn on a newly overhauled radar and get a fine "pip" from a passing plane today, that you will have one day after tomorrow.

Scheduling of work during overhauls can be blamed for most of the trouble. Electronics was still definitely a junior partner in the shipyard firm. In a small space like a submarine control room many trades have to work. Machinists, electricians, pipefitters, and painters, to mention a few, must do major work there. Located there is the air search radar, radio equipment, fathometer, and other electronic equipment. The electronic engineers were nearly always pushed to the last or given the odd moments. In the midst of the last-minute tests the painters, like as not, arrived to mask everything and flourish their spray guns; or the electricians had not finished the cabling and no suitable power was available. Not until the final few days of the overhaul were all components of the major electronic systems, including fire control instruments receiving electronic inputs, ready for test as a whole.

Rarely during the test runs at the end of an overhaul were aircraft or submarines available to give the final proof of the radar and sonar equipment. Instead, if the indications were satisfactory it was "signed off" as completed. It had to be. There was no more time.

A grave handicap for those who fought the battles of maintenance was in the supply of spare parts. In the mountains of electronic spares left over from World War II one might believe would be an ample store of parts of every variety. This was not the case. Shortages of some items were critical in 1950 for several reasons.

The complex nature of electronic materiel means the training of a special breed of storekeeper qualified to identify and handle it. A man who cannot deal with transducers, magnetrons, modulation networks, and fusetrons cannot cope with electronic supply. If he tries, as many were forced to do after World War II, a hopeless muddle is likely to ensue. The shortage of skilled storekeepers was a big problem of the electronic supply system. Shortages developed at many points due to lack of time to identify and ship material from activities who stocked it, or due to mistaken identification and shipment of the wrong item.

Shelf life of some components, notably vacuum tubes, was a potent factor. Some tubes become gassy or otherwise defective after a year or so of nonuse. Large stocks of tubes were found to be defective upon issue. The percentage of bad tubes issued varied widely by no predictable pattern. Some special tubes were about fifty percent defective. Shelf life also affected the service life of many items; old components were likely to fail quickly.

In the educated guessing that had to be done in wartime when deciding upon the number of spare parts to be stocked for a given equipment errors were inevitable. Now we know, on the basis of failure data, that additional numbers of certain items should have been procured. It is hindsight, and it is expensive now for the taxpayer.

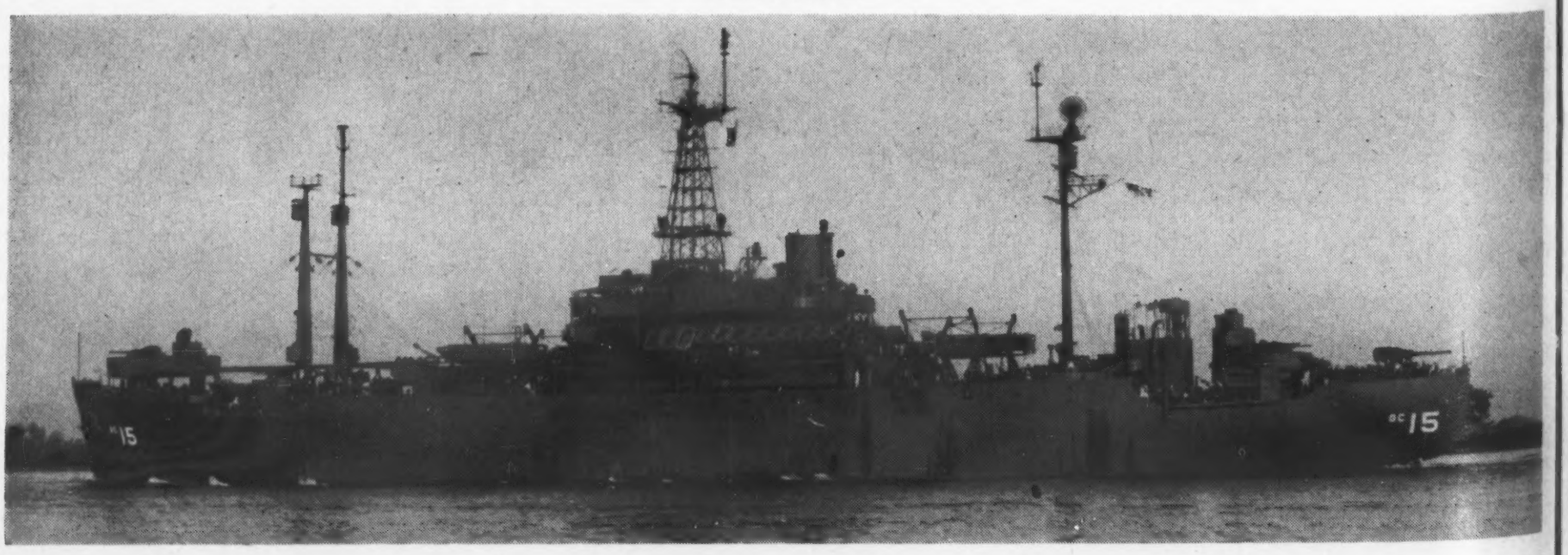
Fine Stock Balance A Need

Peacetime supply policies also create temporary shortages. Obviously, we cannot afford to maintain huge duplicate stocks of electronic materiel at every fleet base and supply center. Unused stocks of special spare parts become obsolete with the equipments. The less we have on hand at that juncture the better. Also the more money we can divert from the purchase of spare parts to the purchase of new equipments the better. Yet we must have an adequate peacetime and wartime reserve of parts. A fine balance must be struck. The attempt was made to stock parts at a central stock point with other supply activities only carrying enough for immediate requirements. Too often dispatch action was necessary to procure an essential item.

The determination of requirements was a great problem. In spite of repeated strong pleas from the Bureau of Ships for the submission of failure reports on eah failure of a component, no matter how small, the response from the field was spotty. The failure report was one of the simplest forms yet devised. It was designed to be filled in in pencil and mailed by the enlisted technician himself directly to the Bureau. It appeared entirely painless, but the electronic personnel of the fleet apparently could not believe that the reports would do any good. They did not understand the reason for a failure report on a tube used in everyday home radio sets. They hated paperwork. Without this means of knowing accurately the rate of failure of components, the Bureau of Ships was severely hamstrung in its efforts to obtain a sufficient number of the necessary components, and to decide when component design needed improvement.

Finances profoundly affected 1950 Navy electronics. Since there was not enough money to have our cake and eat it too, the cash went to research and development. Replacement equipments purchased were few and far between. New pilot models were procured, however, for new construction ships and aircraft. When the Bureau of Ship's eleven millions of dollars for purchase of new electronic equipment in fiscal 1950 is contrasted with the pre-Korean forty-four millions provided for that purpose in fiscal 1951, it is obvious that things are definitely brighter in this area.

The Navy's AGC's, such as the USS Adirondack, pictured here, were designed to serve as communications centers and are heavily outfitted with complex electronic devices. AGC's were "floating headquarters" for many Allied invasions in World War II—the nerve centers of the assaults.



If there were serious problems so, too, were there solutions to these problems. At the center of any comprehensive program for improvement should be the recognition by all of the importance of electronics. Most will protest that they do recognize its importance. Many will be right. But before we can expect real improvement in Navy electronics we must open our eyes to the many glaring inconsistencies which still enjoy life and health. Electronics has not been recognized for its true importance when this indispensable branch of engineering is run by juniors. Like a pesky little sister being ditched by older brothers, electronics gets ditched by the senior shipboard and staff officers. To let electronics go to the junior man who cannot avoid the job has been more often the rule than the exception. To assign heavy collateral duties, such as comunications, to the electronics officer is common practice. As long as electronics is represented by the junior man it will be junior in performance and junior in progress.

The standard organization of fleet units and staffs should be overhauled. On the new command ship (CLC) being constructed, should electronics be relegated to the electronic repair officer, a subordinate of the engineer officer; or to the communication and combat information center officers who are subordinates of the operations officer? Electronics has reached the stage on combatant vessels where it merits departmental status on an equal basis with gunnery and engineering. It follows that the electronics officer on a staff should have equal rank and status with the gunnery officer and the engineer officer.

Nor has electronics reached full recognition when the emphasis in shipyards is on getting the ship out of the yard in the allotted period with the engineering plant and hull in perfect shape and electronics is given a lower priority. In war a ship that departs from a shipyard with hull, machinery, and ordnance in the best of condition, and yet fails to detect an attacker before it is too late due to defective electronic gear, would have been better off never to have sailed. The loss of a ship away from base usually means total loss of the ship and great loss of life. If the ship had been sunk in port, unable to leave due to engine trouble, probably fewer lives would be lost and salvage might be possible. Not that the hull, machinery, and ordnance equipment is not essential, but rather that the electronic equipment is equally so.

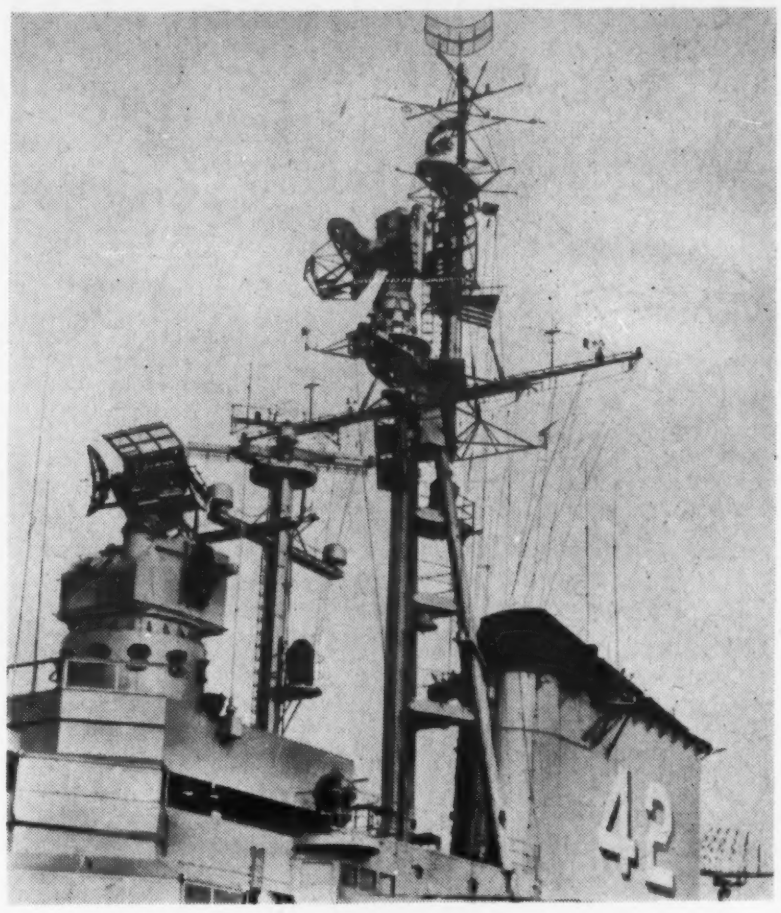
Problem Must Be Met

A new overall attack on the electronic personnel situation should be made. One solution which has been suggested is that the complicated electronic equipment be kept healthy like the human body. Let the electronic technician be the "hospitalman." Provide a new officer specialist on every ship who would be the "doctor" and have analogous duties including "surgery" when necessary. This proposal is radical to the naval service. It would disturb many well-founded and proven relationships between the line officer and the specialist, and between officers and men. Nevertheless, new and more baffling equipments are coming before we have even mastered the present ones. Something must be done now to meet the future problems.

A workable compromise might be to promote the bright electronic technicians, after suitable schooling and sea service, to the warrant officer grades at a much accelerated rate. Warrant billets should then be established in the field of electronics in every unit of the fleet of any size. Fully half of the service of these warrant officers should be in advanced schools or shipyards where they could keep up to date on the latest techniques and equipments. The promise of increased oportunity should hold a much larger share of the best electronic technicians in the service in peacetime. Also the line officers would be able to continue their overall command in electronics without the present gap between their experience and training and that of the enlisted technician.

The various Navy electronic schools at present are doing a splendid job of training as the offers by civilian firms prove. Unless the present chain of events can be broken, however, a small number of electronic technicians will be given advanced training. If we had an inflexible rule that all electronic technicians were to return to advanced school automatically after completion of three years of field service, we could show a positive improvement. Electronics is not static. New schooling is required at regular intervals if the technician is to keep abreast of new devices and methods. Advanced training is essential to advanced "trouble-shooting."

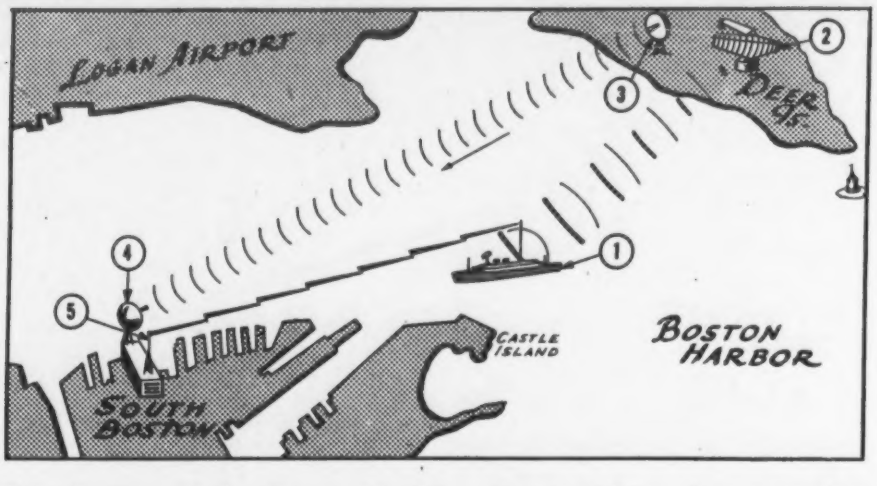
"Electronics in quantity has existed for the regular naval officer for the short span of only ten years. In ten years we have traveled far and fast. We have have come from the day of the human eye to the day of the electronic eye; from the lookout to the radar; from the sextant to the loran; from the visual identification signal to the electronic IFF."



Adequate maintenance depends more upon the solution of the personnel problem than upon any other excepting only the education of the service at large, from which such a solution would certainly flow. Given sufficient properly trained maintenance personnel many of the present troubles would vanish.

Shipyard overhauls are a tough nut to crack. Elevation of the electronics work to equal priority is not the entire answer. Rearrangement in the involved, highly specialized business of scheduling the work on a vessel in overhaul is not to be undertaken lightly. That is not to say that it cannot or should not be done. It has been done before. At one shipyard not long ago the heat was on. A submarine had left the yard and in ten days all major electronic equipment was out of commission. Loud complaints were received from quarters that could not be ignored, with the usual ominous copies to all concerned. The next submarine work had to be good or else. It was decided that two weeks from the end of the overhaul the control room and conning tower would be closed to all trades except electronics during the day shift—and most of the other trades were directed to be finished in those compartments by that time. In particular, all normal electric power had to be restored by the deadline, and all associated fire control equipment was to be in full operation. As a sample of the ship's attitude, the commanding officer stated that if not one drop of paint was used anywhere except behind equipment where the ship's force could not reach, he would be satisfied—*provided only that everything work when he left and stay working.* The ship would do the painting. Of course, the two-week deadline could not quite be met. But a full ten days was saved for electronics. Most of that ten-day period was spent continuously

(*Continued on page* 72, *col.* 1)

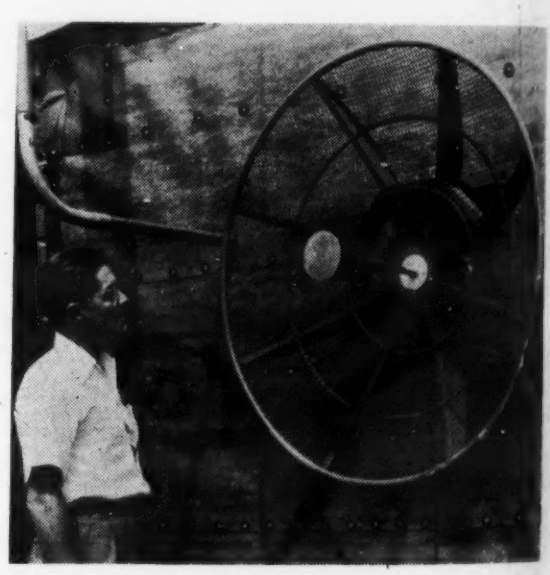


This diagram of the Boston Harbor radar test shows how incoming vessel (1) is picked up by radar scanner at Deer Island (2) the radar picture is transmitted by microwave (3) to microwave receiver at Commonwealth Pier, South Boston (4) where information concerning the vessel's position and progress into the harbor is radio telephoned (5) to ship.

A huge scanner, 40 feet wide, is the "eye" of the Harbor Radar system. It is shown in position for tests at Deer Island, at the entrance to Boston Harbor. Antenna can operate in winds up to 100 miles an hour.

RADAR GUIDANCE FOR HARBOR SHIPPING

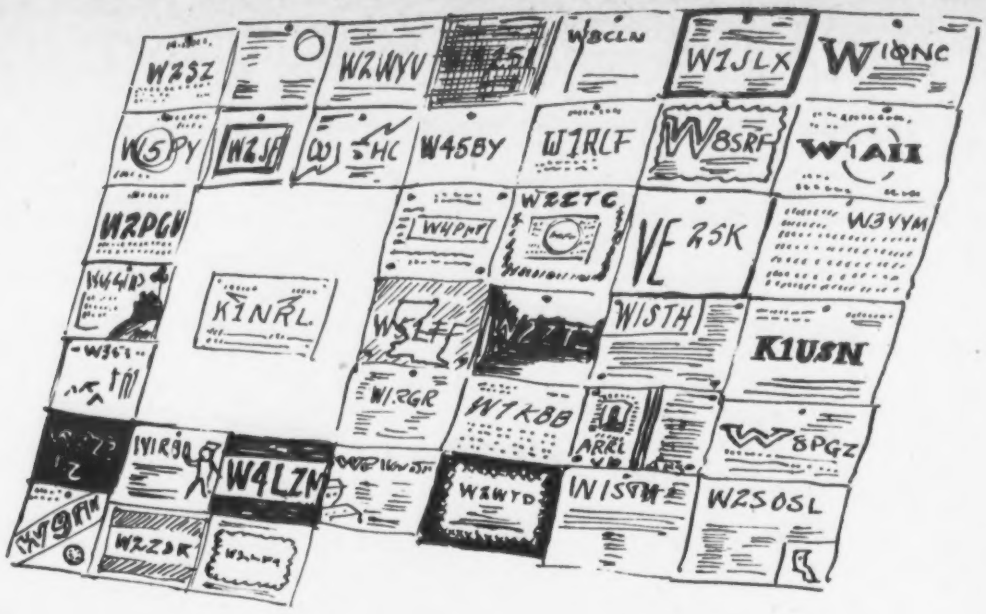
A revolutionary step toward radar guidance of harbor shipping was recently demonstrated by the Port of Boston Authority. The system was designed and built by Raytheon Mfg. Co. for the Port of LeHavre, France, and contains new and advanced features including multi-scope control, micro-wave link and one of the world's largest radar antennas.



As shown in position at Deer Island installation is antenna of microwave link used to transmit radar information from island to receiving station at Commonwealth Pier, South Boston, which served as Harbar Radar Center for test and demonstration.

Left: Battery of four 16-inch radar scopes, providing the largest direct-view presentation ever made for commercial use, is shown in the temporary building atop a gun emplacement at Deer Island. Boston Harbor tests were made before Harbar Radar was shipped to Port of Le Havre, France.

Amateur Radio and the National Emergency



By Harry Paston
Assistant Secretary, ARRL

Amateur radio operators are rapidly cutting a new niche for themselves in radio's hall of fame as a result of contributions made in the public interest during the present emergency. Long experienced in emergency communications work (their historical role in this field of communications) amateur networks and club groups throughout the country are acting to aid in furnishing radio communications for rapidly expanding state and municipal civil defense programs . . . amateur know-how combined with professional experience is aiding the communication industries' vastly expanded defense production program . . . everyday, hundreds of messages flow into the States from our Armed Forces overseas through inter-continental amateur traffic networks reaching to Japan and Germany . . . and amateurs too are continuing their military self-training by actively enlisting in the Military Amateur Radio System program of the Army and Air Force.

When the Federal Communications Commission announced that frequencies would be made available to amateur radio stations operating in civil defense communications during wartime, amateurs were well on their way to what eventually will be part of the complete nationwide civil defense communications system. Throughout the nation, since the middle thirties, amateur radio operators have been organized by the American Radio Relay League, national association of amateur radiomen, headquartered in West Hartford, Conn., into an Amateur Radio Emergency Corps (AREC). AREC members have always stood ready to provide emergency communications during floods, hurricanes, storms and other disasters. Their efforts through the years in such national disasters as the Johnstown Flood of 1936, the great hurricane which swept New England in 1938, the Texas City disaster in 1947 and the recent Kansas-Missouri floods is record. It was obvious to amateur and civil defense leaders therefore, that existing networks of amateur stations could readily be built into civil defense communications groups on a city and statewide basis. This has been done in widely scattered parts of the nation, present day progress assuming excellent proportions. In fact, when the Seattle Atom Bomb test was planned in late 1950, it was discovered by the civil defense authorities that the amateur radio group in that city was the most completely organized and best equipped unit available.

Amateurs have been working closely on the state level to establish statewide communications systems. More than a year ago conferences between the Section Emergency Coordinator for Connecticut and the State Police Commissioner led to the formation of a State Police Amateur Radio Auxiliary Corps which, together with the Connecticut Amateur Radio Emergency Corps, formed the nucleus of a civil defense communications system which today blankets the state using more than a dozen fixed stations and well over one hundred mobile units. Each major city and town in Connecticut has a local control station with associated mobiles. These local control stations in turn report into the state net, providing effective coordination—all via amateur radio.

KG6FAA, station of the 19th Bombardment Wing on Guam, has routed more than 10,000 messages to stateside stations in the national traffic system.

Battery-powered amateur radio station is permanent part of Sault Ste. Marie's civilian defense setup. It is shown in operation during recent simulated atomic bomb test on the Soo Locks.

Although far advanced, Connecticut is not alone in making effective utilization of the experienced and equipped amateur operators. The New York Civil Defense Commission has urged all local directors to make every effort to secure the assistance of amateurs in their communications program. A New York State civil defense amateur radio service has been formed. Amateurs enrolled in this program will use their own equipment to maintain a communications system to serve in their area as well as participate in a statewide network.

Elsewhere throughout the nation and in Alaska, AREC section and local emergency co-ordinators are participating in community and statewide communications plans making effective use of amateur facilities. Amateur groups are awaiting announcement of the radio amateur civil emergency service (RACES) rules, soon to be released by the FCC.

Many of the statewide civil defense nets are presently organized as regular amateur traffic networks. A complex system of networks criss-crosses the country and extends overseas permitting efficient and rapid handling of third-party traffic by amateur radio. Many of these nets are part of a national traffic system which makes it possible for a radiogram started in New York City in the early evening to be relayed through networks across the continent to San Francisco, delivered to the addresses by telephone and a reply relayed back the same evening. True, most amateur communications is by point to point transmission, but those persons interested in traffic handling have historically based their entire system upon networks. It was, in fact, upon this basis that the American Radio Relay League was founded back in 1914 by Hiram Percy Maxim, well known Hartford inventor and scientist. Mr. Maxim, having difficulty reaching Springfield, Mass., with his spark transmitter, conceived the idea of relaying the message through a station between the two cities. From this little incident was born the idea of establishing a national relay organization. Although the original purpose of the organization has long been supplanted, the relaying of messages by amateur radio still captures the fancy of many operators, some of whom handle upwards of several thousand messages a month, many of these from troops in Korea, Japan and Germany.

Amateur radio is obviously a many faceted avocation. There are some 91,000 outstanding licensees in the United States and possessions at present. Two ways in which the amateur contributes to the public welfare have been related but amateur radio fulfills another equally important role—that of individual self-training. Amateur radio is, in fact, probably the greatest training ground for shaping future—and even present—careers in the electronics industry. Witness the many leaders in this industry today who gained their start and impetus in radio and electronics through early experience as amateur radio operators. Many are indeed still active amateurs today. AFCA's President William Halligan, Arthur Collins, president of Collins Radio, Dr. Allan B. DuMont, Dr. Daniel Noble of Motorola are but a few. George W. Bailey, executive secretary of the Institute of Radio Engineers and an AFCA director has been amateur radio operator for years. He is also the president of ARRL.

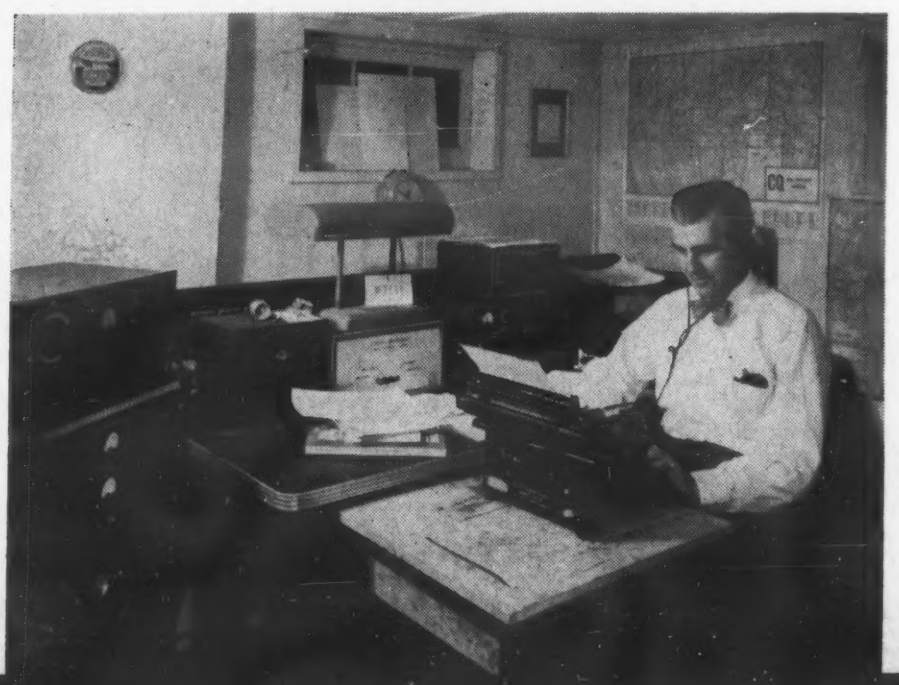
With a continually expanding industry, the need for getting more trained newcomers becomes apparent. What better way of introducing the fascinating science of electronics to young people than through the facilities of amateur radio? With this thought in mind, the Federal Communications Commission with the wholehearted support of the ARRL, announced changes in the amateur licensing structure which would lower the entrance requirements necessary to obtain a license. The new Novice Class license examination requires the applicant to send and receive International Morse Code at a speed of five words per minute and pass a simple written test of some twenty multiple choice questions designed to ensure that the applicant is familiar with regulations and operating principles. Already, some 2000 Novice Class licenses have been issued

George Hart, national emergency coordintor of ARRL, shown operating a six-meter civil defense portable set designed for use by radio-logical monitoring teams.

by the commission since the date of the first examination on July 2. Among those is William Halligan, Jr., son of AFCA's prexy, who now holds the call WN90EP (novice call letters prefixes are WN).

Many of the new novices are persons who previously were confronted with the code as a stumbling block. The experience gained during on-the-air contacts should readily ensure their obtaining the speed of thirteen words per minute necessary to obtain the next higher class of amateur license. That such proficiency must be acquired is indicated by the one-year non-renewable terms of the Novice License; other amateur licenses being issued for a period of five years on a renewable basis. Another new license recently made available is the Technician Class license. Permitting operation on amateur bands above 220 Mc., this license is designed to encourage experimentation on and exploration of the higher frequencies. The code test is the same as for the Novice Class license, the written examination the same as for the

One of the key stations in the eastern area net, a part of the national traffic system. Completely equipped for operation on most amateur bands, the operator handles a large number of messages each month.



Dramatic shot taken just after successful crossing of a half-mile long stretch of flooded and undermined highway to deliver a 10 meter pack set badly needed at Mankato, Minn. for use in patrol work on amphibious DUKW during recent floods.

General Class license, the next higher grade.

The new novices provide a potential build-up in the amateur radio sales market. True, the buying power of this group will not be large at first. Many will start with simple equipment but as they progress in amateur radio they will expand and better their stations, purchasing new receivers and building or buying bigger and better transmitters and associated test equipment. In the long run, they may well represent the bulk of amateur equipment buyers.

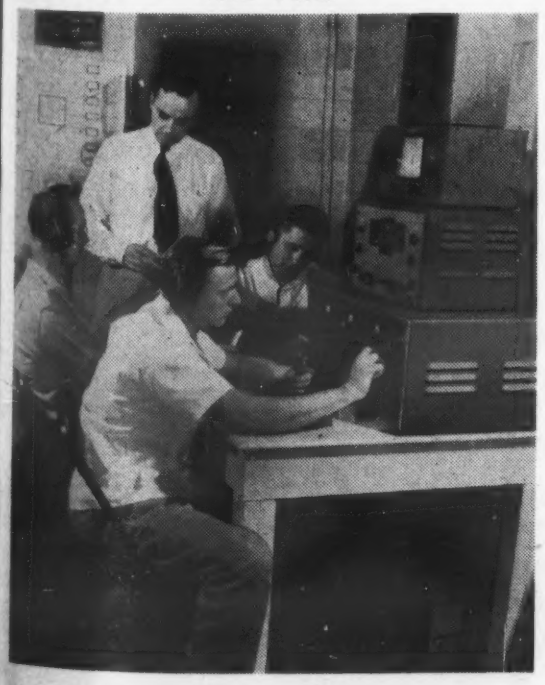
Open to all ages, this new class of license has attracted many adults to the hobby of amateur radio. Promotion and publicity of the new entrance requirements has been widespread with special emphasis being directed at young groups such as the Boy Scouts (Boys' Life magazine is running a series of stories and constructional articles on amateur radio prepared with the co-operation of ARRL).

In addition to their other roles, amateur radiomen (and women—there are about 2000 of the fairer sex) provide the armed services with a reservoir of trained operators and technicians. In World War I, the Navy first called upon Hiram Percy Maxim in his capacity as ARRL president to furnish 500 operators. Could the League supply them—and much needed radio equipment from its members? Within ten days the Navy had its operators. A second call for 2000 volunteers was answered with equal dispatch until by the end of the war it was estimated that between 3500 and 4000 radio amateurs saw service, forming a considerable portion of the Navy and the Army Signal Corps radiomen ranks.

Between wars, amateurs took it upon themselves to be better prepared to serve their country in the event of another disaster. In 1925, the League and the Army joined forces to anaugurate the Army Amateur Radio System. The United States Naval Reserve in the same year under a plan arranged with ARRL offered ratings to licensed amateur radio operators in the Naval Communications Reserve. The AARS did not require enlistment in the Army but merely served as a training network to indoctrinate civilian radiomen into Army procedures and methods. By the advent of World War II there was perhaps 8000 to 10,000 operators enrolled in the two groups.

WAC operator Mary Laffler shown in one of the four QSO booths available for visiting hams to operate at the MARS amateur station in the Pentagon concourse.

During Operation Niagara last June this amateur radio station was the central control station for emergency communications in a simulated atomic bomb attack on New York.



Typical amateur radio mobile installation. All controls are within easy reach of the driver. A band-switching converter is mounted on the steering column with a companion band-switching transmitter visible under the dash.

Some 25,000 amateurs served the nation in World War II, most of the 35,000 others served in defense production tasks (many in key electronics positions) or participated in the wartime War Emergency Radio Service which utilized amateur equipment and the pre-war amateur two and one half meter band.

The necessity of continuing the close relations between amateurs and the armed forces was obvious after the cessation of hostilities in 1945 but it was not until 1948 that the Army and Air Force organized the postwar counterpart of the AARS. Navy communications planners already had established and functioning Naval electronic warfare units which made full use of amateurs, both experienced veterans and new enlistees. In December, 1948, the Army and Air Force established the Military Amateur Radio System, familiarly known as MARS. Membership was at first limited to licensed amateurs who were members of the reserve, national guard, or the regular establishment, but last year both services expanded to take in civilian amateurs, carrying on the original purposes of the old AARS. MARS stations receive a counterpart of their regular amateur call, the prefix A or AF replacing the usual W, AA and AK the K prefix. MARS Army and Air Force nets are established throughout the country operating on frequencies adjacent to the amateur bands using military procedures. Headquarters station is in the Pentagon Concourse, K4USA for the Army, K4AF for the Air Force.[1] The station is on the air 24 hours daily.

MARS is designed to create interest and further training in military radio communications. As an additional step towards the continual creation of trained operators, MARS has just announced that novice and technician licensees may make application for membership.[2] Membership in MARS as of October totaled 6750, 3318 in the Army, 3432 in the Air Force.

Amateur radio continues to keep its place in the national communication scene. The contributions of the thousands of amateur radio operators are manifold, but of even greater importance is the personal pride of these men and women aiding their nation through their avocation.

[1] *See* SIGNAL, *Nov.-Dec., 1950, pgs. 12-13.*
[2] *See item in News section, this issue.*

"One if by land"

By Lt. Jack Colborn

"One if by land, two if by sea, and I on the opposite shore shall be, ready to ride and give the alarm. . ."

From the day of Paul Revere, when the United States was in its infancy, to this day when we stand as a major world power, signal communications have played an important role in U.S. warfare.

At its beginning in 1862 the U.S. Army's Signal Corps consisted of one man, Major Bennett Meyers, who was then a doctor. Today it is made up of thousands of men from every state in the union and covers millions of miles of communications, providing a ready link between the Defense Department and war theaters, and enabling theater commanders to talk to smaller unit commanders and coordinate them to maximum advantage.

The Signal Corps today is a massive organization of various departments, with headquarters in Washington, D. C. In other parts of the country are its big research and development laboratories, training installations and schools, and in the States and overseas are its many large depots necessary to handle a myriad items of supply. The Signal Corps is responsible for the installation and maintenance of a vast network of communications in the U.S. and over the world, but its end mission is to provide communications and photography in combat. The end product of its research and development and training and supply is the unit in the field. One such typical unit in a combat area is the 4th Signal Battalion now in Korea.

Activated during World War II, at Camp Young, California, September fifth 1942, the 4th Signal Battalion was given intensive training and preparation for overseas duty and sailed for Scotland, aboard the Queen Elizabeth, in March of 1944. In the U.K. there followed the preparations for the invasion of Europe, climaxed by the landing on Omaha Beach a few months after the 4th's arrival in Scotland.

During the European campaign the battalion performed communications missions in France, Belgium, and Holland. VE Day found it in Klotz, Germany. Subsequent to the cessation of hostilities, all Ninth Army communications were entrusted to the 4th Signal Battalion which was awarded battle streamers for the Rhineland and Central Europe campaigns.

Deactivated on the 29th of September 1945, in accordance with the demobilization program, the battalion's inactivity was short-lived, for the Army in recognition of the importance of this particular organization, reactivated the 4th at Fort Jackson, South Carolina in January 1946. February found the 4th Signal assigned V Corps at Fort Bragg where it remained until August 1950.

The time spent at Fort Bragg entailed more than the normal duties and training, for the corps participated in Exercise "Assembly" held in Camp Campbell, Kentucky in May and June of 1948 and "Tarheel" held in Camp McKall in North Carolina in April and May 1949. Amphibious training and coordination with naval forces was gained in Exercise "Portrex" held in Puerto Rico in March of 1950. And with Exercise "Swarmer" held at Camp McKall in April and May 1950, the battalion was prepared to work closely with airborne troops.

Recognition of the potential and experience was not long forthcoming for on August thirteenth, the battalion left Fort Bragg on orders to the Far East.

Could they meet the task ahead? Would the battalion uphold their motto, "We get the message through?" They were soon to know the answer. With the famous X Corps, they left Japan to take part in an amphibious attack that would go down in history.

SEPTEMBER 15TH—INCHON

This was what the battalion had been waiting for. From the experience of "Swarmer, Tarheel, and Portrex," they were ready to do their job.

As the Marines hit Wombli-do and Inchon itself, radio and construction teams of the 4th went in with them. Their performance was such as to cause a Marine officer to remark, "They'd make mighty fine leathernecks."

Even before the city was secured, a message center had been set up by the 4th to handle X Corps traffic and there were teams close on the heels of the

Brig. Gen. George I. Back, FECOM signal officer (now a major general and Chief Signal Officer) and Lt. Col. Chester L. Martin, CO, 4th Sig Bn, during an inspection of the 4th's signal installations in Korea by the general.

advancing marines and "doughs" of the Seventh Division.

With the aid of the communications provided by the 4th, Seoul fell to the victorious X Corps and was immediately returned to Korea's president Syhgman Rhee by General of the Army Douglas MacArthur. Though he may not know it, the public address system over which the general spoke during the ceremony, was installed and handled by men of the 4th.

From the Inchon-Seoul campaign, General Almond's X Corps drove in at Wonsan and advanced north to the Yalu. By now the signalmen of the 4th were operating with the skill and efficiency born of war, and the lines strung from Wonsan to Pochong, the AN/TRC and repeater stations along the way and the radio nets capably maintained, gave the X Corps a communications system unprecedented in the annals of warfare.

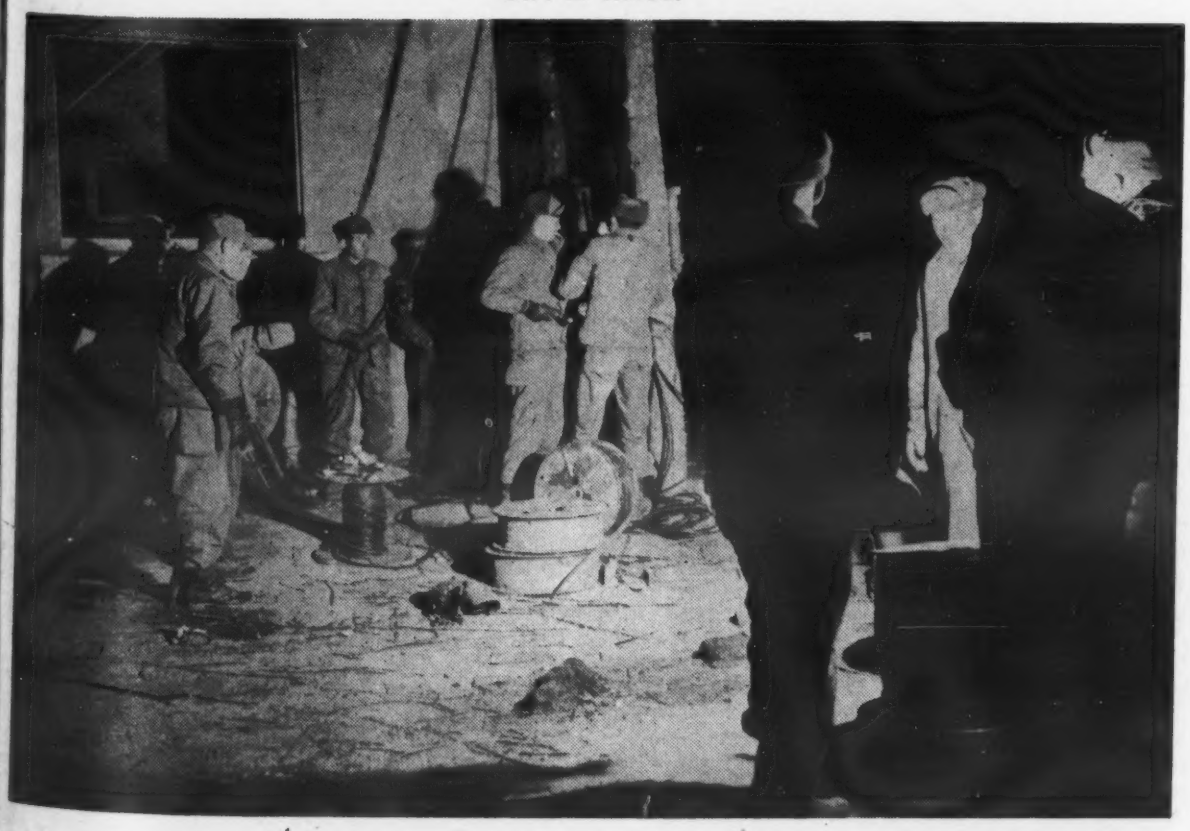
It hadn't been easy. Men who had climbed poles in Indiana, Connecticut, Oklahoma and Oregon for the Bell System, were now climbing them under enemy fire. At Yonghung, some forty miles north of Wonsan, a construction team was surrounded and ambushed by North Korean guerrillas. No Ohio or Southern Bell linesman ever had to work under these conditions.

The weather constituted another severe handicap. Carrying radio-relay equipment up mountains over icy trails and snow-covered rocks meant added hours of labor to repeater station operators. During falling snows and howling winds linesmen were maintaining the thousands of miles of wire laid by the 4th over mountain trails, at night and for days on end without relief.

Cpl. Angelo Saprano, 4th Signal Bn. Corps, leans dangerously over cliff while working on communications pole in Korea. Positions like this subject the linemen to sniper fire.

Second team, 1st platoon, "C" company, spanning a bridge with spiral-4. This line was laid from X Corps rear to X Corps advance during below zero weather in January.

Personnel of "C" company, 4th Signal Bn., installing spiral-4 and ten pair cable at X Corps C.P. in Korea.



Meanwhile, switchboards were being installed, maintained and operated by men who had once drawn their pay checks from A.T. and T. and many Bell offices. TC-2's, 4's and 10's ran local and long distance lines to over 150,000 subscribers. Operators often had to work through as many as six local and three long distance boards to get a call through on lines that were cut by the enemy an hour before the repaired only a few minutes before by the crews.

Radio operators too, kept up the steady flow of traffic over SCR-399's, 499's and 193's. Resistors and condensors burned out, tubes blew and transformers buckled under the round-the clock traffic loads but the men of the 4th Signal never failed in their job to maintain communications.

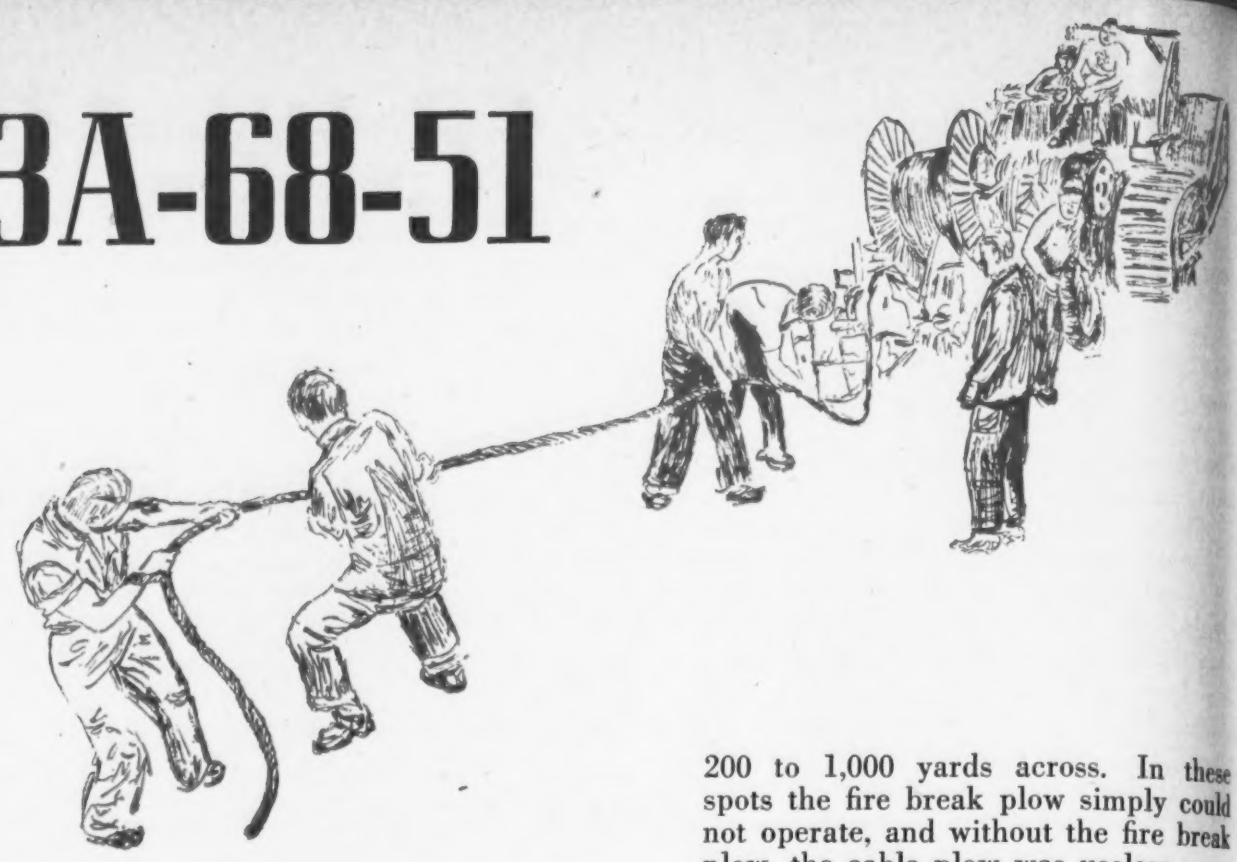
Teletype operators put the traffic out as fast as the TG-26's and 7's could carry it and those who had once worked for U.P. and A.P. to get the football scores to the papers, were now getting the battle scores for Uncle Sam.

At Hagaru-ri, eighty-seven men who were trained Signal Corps specialists forgot their jobs momentarily while they repulsed the attacks of wave after wave of Chinese Communists. All of them didn't return but those who did had the pride and knowledge that the Signal Corps had proved their worth not only as technicians but as soldiers as well. The Marines fondly named an icy ridge for them "Communicators Hill." Signalmen held it for fourteen days.

During the dramatic withdrawal from the Hungnam perimeter ,the 4th calmly

(*Continued on page* 80, *col.* 1)

Project 3A-68-51



By: Capt. R. L. Oertle
Signal Corps

"Project 3A-68-51, Installation of Range Telephone Cable at Camp Stewart, Georgia." That's all it says in the records so you shrug your shoulders and damn the guy who got a soft billet as post signal officer.

What Project 3-A-68-51 turned out to be! 65 miles of plowing in cable through tangled underbrush and woods with about 5 miles distributed over six swamp areas populated by rattlesnakes, wild turkey and deer.

Third Army's installation team from Fort McPherson, headed by tough M/Sgt. Perry Anthony, assisted by Sgt. Clarence Hillis, both Signal Corps veterans, and backed up by six linesmen and two cable splicers, tackled the job.

You can't operate a cable plow through underbrush and trees, so the aid of the Corps of Engineers was enlisted in providing a firebreak plow pulled with a D-6 tractor. This removed about eight inches of top soil and at the same time removed most of the tree roots which provided a fairly smooth path for the cable plow. After this came a circus-like procession consisting of a D-7 tractor pulling the cable trailer, and bringing up the rear the cable plow, attached by an improved trailer hitch. This apparatus, believe it or not, moved at a speed of five miles an hour. Even with the fire break plow providing a path, the lightly constructed LC-61 plow couldn't take it without an occasional break. Let CWO A. D. Johnson tell it. "We had to improvise a clevice trailer hitch between the cable trailer and the cable plow using a pole step to connect the equipment. Then, when we got a pull slightly more than the plow would stand, it would bend and disconnect the cable plow." (Johnson, the officer-in-charge of the installation team, is the modest guy in the background who figures out the tough ones by drawing on his 21 years' experience in all sorts of tough telephone construction jobs.)

The real meat of the operation came in the swamp areas, which ranged from 200 to 1,000 yards across. In these spots the fire break plow simply could not operate, and without the fire break plow, the cable plow was useless.

Here, they resorted to a river crossing technique plus a little more improvisation. How to set these poles in three or four feet of swamp? Dead end poles with three way down guides were erected at the swamp edges. Swamp poles were set by using a ¼" thick steel barrel, sawn in half vertically, with holding clamps as shown in the illustration. Using this as a caisson, the excavation was made and the pole set. Because of the terrific suction, the barrel had to be hoisted by means of a snatch block affixed to the top of the pole. As soon as it cleared the surface, the holding clamps were opened and the barrel swung free. From that point, it was merely a matter of pulling the cable through the messenger rings.

It was also a matter of merely watching out or listening for the deadly rattlers. Every man had a first aid kit and a requisition was placed for Snake Bite Kits M1A1.. No remedy was found for the pink elephants every man saw when the dav's work was finished.

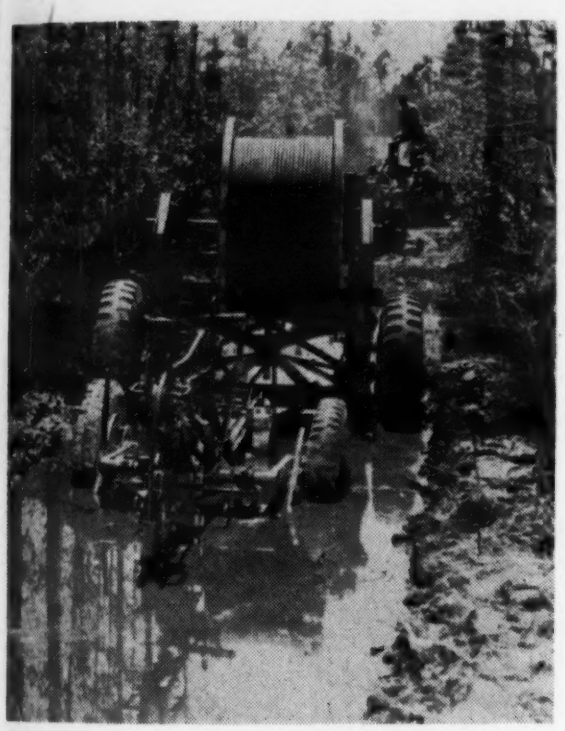
M/Sgt. James T. Young, displays steel barrel he perfected to assist in sinking telephone pole holes in swampy ground. Metal dowels inserted through the hinge-like flanges, connect the two sections, and the barrel is lowered in the post hole to prevent excessive cave-in of loose soil. Without the aid of this barrel, walls "mushroom" at the bottom of the hole causing it to enlarge and cave in.

Five spans of overhead construction were required to cross the Canoochee River, on the Camp Stewart reservation with two-pair jute- protected cable which has been buried to all range guardposts.

Large log was snagged by cable laying plow during project. Such hidden obstructions often cause costly breakdowns and wasted time while telephone cables are installed.

Ruggedest conditions are encountered as telephone cable is laid through Camp Stewart's swamp areas.

Project 3A-68-51



Rear view of cable plow and trailer which bogged down in Camp Stewart swamps during the installation of underground telephone cable to range guard stations.

Hard to locate, underground obstruction caused frequent breakages of cable-laying equipment used by members of the Third Army Signal Installation team and Post Signal workmen.

View of half-submerged D-6 Caterpillar tractor, together with firebreak plow and cable trailer which bogged down during cable laying operations.

Men, mud and machines play a tug of war in the struggle to lay underground telephone cable through swamp area.

ARMY'S BIGGEST LITTLE AIRLINE

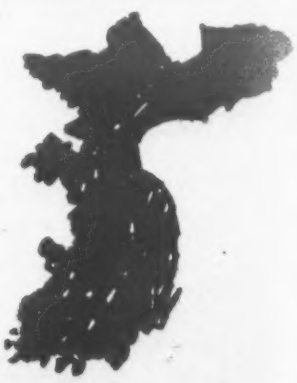
Events in Korea have just completed a strange cycle in military history. The Army Signal Corps, which hatched the Air Force by buying the first American military airplane from the Wright brothers before World War I, is now hatching a new but smaller air service. Today, over the dusty, arid hills of Korea it is operating one of the world's biggest little airlines.

The midget airline performs an important job which is as old as warfare—getting the messages through. While most people think of battlefield messages flitting back and forth via telegraph, telephone or radio, there is still a great bulk of documents, maps and photographs which must travel by messenger. In one recent month the airline hauled 34,000 pounds of messages between Eighth Army and the corps headquarters.

Carrying messages by plane is nothing new, but in Korea it has become more important. Jeep, or motor messenger service, had always received more use until the Korean campaign made getting messages from one battlefield to another more difficult. There are few roads there, and all of them are rough. It doesn't take many miles of bouncing over Korean roads to ruin a vehicle even as tough as the Army jeep and with so many other military vehicles on the narrow, dusty roads it takes too much time to get from one point to another.

The answer to the bad roads was the light airplane, the L-5, or "mosquito." While it took a jeep two days to make a run from Army field headquarters to a certain corps headquarters and back, the light airplane does it in four hours or less. In fact, the first plane the Signal Corps recruited for this kind of work put 15 to 20 jeeps out of work.

Today, with five planes, five pilots and a ground crew of seven, the Air Section of the 304th Signal Operations Battalion is a busy outfit. Since September, when it got into operation, it has hauled a total of 82,000 pounds in pay loads. Charts in



the operations hut show its planes are making 80 flights a month. Each pilot puts in about 75 hours of flying time a month, which means he has to make a flight every day of the week with few exceptions.

There is nothing fancy about the way the airline operates. Each day before noon a jeep brings out the messages in mail sacks and tosses them inside the door of the operations hut alongside the dusty airstrip. A clerk inside tallies them in and marks them for different corps headquarters. Sometimes there is a passenger but the maximum pay load is limited to 400 pounds. At 1 o'clock the pilots walk back from the little mess hall and climb into their planes. The ground crew, one mechanic to a plane, has already given the planes a final check and squared away the baggage in the rear compartments. With a wave from the pilots the planes waddle out to the end of the strip and take off.

If nothing unusual happens they will be back before sundown. They follow routes carefully plotted on the map in the operations hut. Each pilot picks his route from the weather information given him before taking off, tells the clerk which route he will use, and when he arrives at his destination he sends word back by telephone which route he will use on the return trip. These precautions are always taken so that if a pilot gets into trouble a search plane will know where to look for him.

Except for these measures, the "mosquito" pilot is left on his own to get from one temporary landing strip to another with his cargo. There is no radio beam to guide him, and though he carries a radio its range is too short to be of much help and, even if it were longer in range, there is no one to listen for his distress signal.

He travels like an Indian scout, checking his position with known landmarks along the way. Rivers, mountains, roads, lakes and villages spread out below him in a great map. Usually he flies within view of main supply roads where he could get help if he had to make a forced landing. And, if he is forced to land, the broad, flat banks of the Korean rivers make good places to bring down a light plane in an emergency.

The little airline has an excellent record for both safety and faithful service. So far no plane nor pilot has been lost. Yet, in a country notorious for poor flying weather, the pilots have admitted only ten times in eight months of operations that it was too dangerous to fly.

The light plane messenger service fills a gap between jeep messengers and big plane courier service. Most division and corps headquarters manage to clear a landing strip nearby, but there isn't always room enough for the big planes or the improvised fields may be too soggy after a rain. That's where the light plane brings in the "bacon."

In World War II light planes did a similar kind of job, but it was not recognized until recently that what was needed was genuine operate-it-yourself, light plane messenger service. Pilots and planes were recruited from the Infantry and Artillery, where the light plane has been in use as an observation and spotter plane. The world's biggest little airline had been born and the Signal Corps had its early wings back again.

Major Russell T. Blair, officer in charge of air section, 304th Signal Battalion, in Korea watches crew chief Cpl. William L. Shumake overhaul light plane engine. Each plane has own crew chief for first and second echelon maintenance.

Day's flights completed, pilots of the US Army photo section, 304th Signal Battalion in Korea, take a moment to read mail from home. R to L: Lt. Irwin J. Kersey; Maj. Russell T. Blair, officer in charge; Capt. Julian A. Hawkins; Capt. Robert R. Stanfield, and Capt. Walter C. Pitt. There are five pilots, five planes and five flights daily.

Crew chiefs Parker & Klaus carry mail from operations shack to planes. Klaus' father was member of original Signal Aviation Section during World War I.

Electron Tube Reliability

By E. Finley Carter
Vice President in Charge of Engineering
Sylvania Electric Products Inc.

Many present day applications of electron tubes, particularly in the military field, call for a degree of reliability in tubes which has not been generally available. In view of the many millions of tubes made over a period of years by a variety of manufacturers, this may be somewhat puzzling. However, there are well founded reasons for this condition which are analyzed here. Also, some suggestions are made to both users and designers of tubes for obtaining the required degree of reliability for the job at hand.

The electronics industry is in a transitional period which started before the beginning of the second world war. There is no end in sight of the increasingly complex demands upon electronic circuitry and with greater complexity there is required even greater reliability.

Many of us grew up in what might be called the "radio industry." The highly competitive nature of the radio receiver phase of this industry was and still is reflected in its products. Ingenuity has been directed toward designs suitable for mass production where, because of the quantities involved, profit margins have been dependent upon savings of pennies per set.

Absolute perfection, even if attainable, does not constitute most economical design for amusement and entertainment service. There is a delicate balance between the cost of manufacture and the cost of field service. It is considered good competitive practice to design close to the edge as long as cost of field service in dollars and in good-will is less than the increased cost of a more conservative design. Inconvenience, rather than failure of a mission or loss of life, is the penalty of malfunction. Even so, the advent of television, with the greatly increased number of components in a television receiver and therefore the higher statistical probability of failure, has dictated general tightening of standards.

The war and the performance requirements of military electronic equipment brought to all of us, equipment and component manufacturers alike, problems of a new order of magnitude. No longer is mere inconvenience, or even loss of good-will, the price of failure of a tube or other component. The grim purpose of war must be served. The enemy plane that is missed because of such a failure may be carrying a bomb which will bring great destruction to one of our cities. An important mission may be aborted because of a seemingly minor failure. The lives of our men and vast sums invested in military equipment are being bet on the dependability of vital electronic gear. Nor is such dependence upon electronics for life and safety limited to military equipment. One cannot fly across the mountains or oceans or be stacked in the clouds over a busy airport without having to rely upon the proper functioning of apparatus for which we, as electronic engineers, are responsible.

This is a heavy responsibility, and I am sure we all want to take adequate precautions to insure dependability in the design and production of such equipment.

Our most immediate need is greater knowledge and better understanding of the task at hand. We must discard some of the habits and practices which are acceptable in a competitive entertainment economy, but dangerous if carried over into the design of military, navigational, or other vital equipment. We must thoroughly analyze and evaluate the more difficult requirements and come up with a well integrated solution. To do this, there is a need for dissemination of knowledge of the functions to be performed by the components that go into electronic systems. I believe there is much that manufacturers of vacuum tubes can do to acquaint users of what tubes can and cannot be expected to do, and how they might be used most effectively for the purpose at hand. In order to do this well, a close liaison needs to be maintained between the equipment designers and the electron-tube engineers so that a thorough understanding of the application as well as of the component itself may result.

Too often an electron tube is considered as just a component, and it is not fully realized that it is a very complex system in itself. Practically all of the known physical sciences are called on in the production of an electron tube, and still much reliance must be placed upon the art of making and processing it. The variables are so great that statistical analysis, much like that employed by the life insurance actuary, is required to evaluate the probabilities involved in the production and application of these devices. It is well known that both human beings and tubes suffer from a small, but significant mortality in early life. In both cases if life continues past the early critical period, the chances of a fairly long life are improved. Electron tube engineers are making steady progress in reducing early failures in tubes, just as medical science is steadily reducing infant mortality, but the stage has not yet been reached in either case where early mortality can be ignored. Just as there is human mortality by accident, by epidemic and through ultimate old age, so are vacuum tubes subject to failure because of

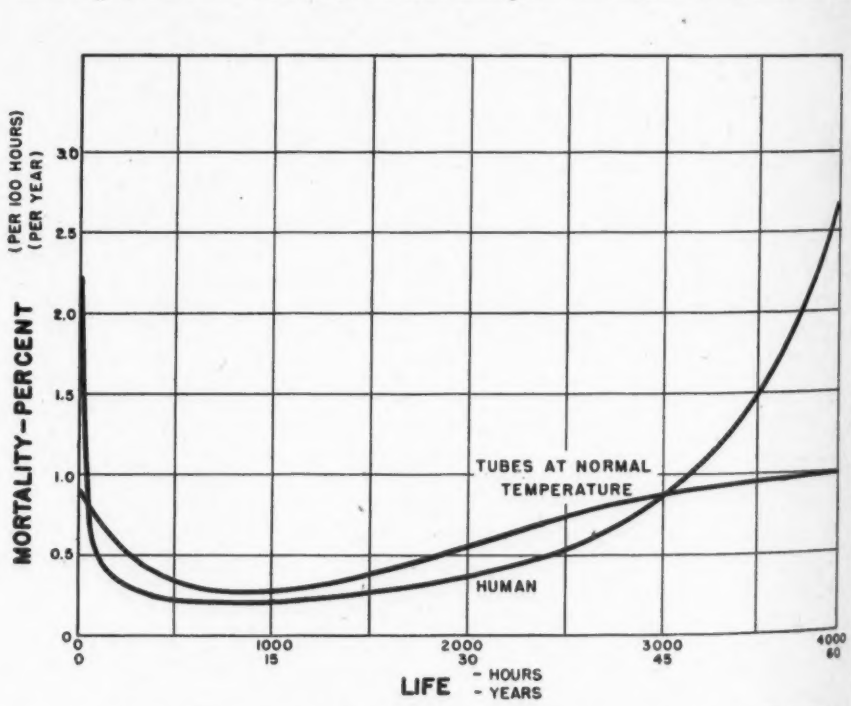


Fig. 1—Mortality curves for humans (1941 tables) and subminiature tubes having special attention for reliability.

other defective components, because of contamination, because of physical weakness and because of old age. Furthermore, vacuum tubes can be damaged beyond repair by overwork or overload just as an engineer, a salesman or an executive in the electronic business can be. It is interesting to note the great similarity between life data accumulated on a relatively large population of tubes tested over a period of time compared with an actuarial curve on human mortality taken from insurance tables. You will see the striking similarity that has been noted above Figure 1.

Figure 2 shows the rate of failure curves for tubes operated under normal life test conditions. I would like to point out

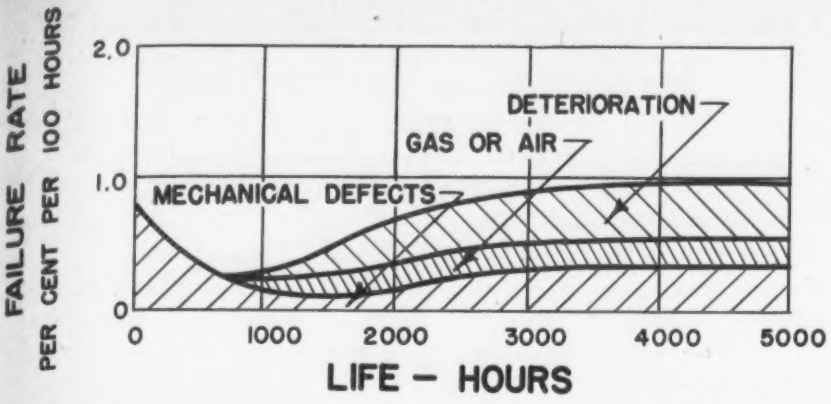


Fig. 2—Failure rate curves for tubes of Fig. 1 for normal operation. Mechanical defects are chief cause of early failure.

the fact that the majority of early failures are due to mechanical defects. The percentage of mechanical failures per 100 hours reaches a low point early in life and does not rise much for the remainder of life. Failures due to gas and air increase slightly during life as do failures due to deterioration of performance characteristics. In many cases tubes are operated at high ambient temperatures and it is interesting to see how this affects the rates of failure for various reasons. Figure 3 shows the mortality curve for tubes operated at an ambient temperature of 175 degrees Centigrade compared with the curve for normally operated tubes and the human mortality curve. These data were taken on subminiature tubes which have received considerable attention for reliable operation. They represent what we can expect from such tubes at the present time.

Figure 4 illustrates the improvement in human mortality tables used by the life insurance companies. We see that there has been a very great improvement in early deaths during these 73 years due to advances in medical science. We can expect the same kind of results on early life of electron tubes if we apply concentrated effort to the problem. The support given by fundamentally interested tube users will necessarily determine the time when we obtain significant results.

Realizing that the best figures so far obtainable on the rate of tube failures run around two-tenths of one per cent for 100 hours, and also that this is considerably better than can be expected for the average tube made to meet entertainment standards, what can be done to design equipment that will operate with the required degree of reliability? The first thing we must do is to utilize what we already know to the fullest possible extent. Tubes for vital applications should by no means be procured on the basis of price alone. Other stipulations relative to quality standards must be carefully considered.

It must be realized that although certain tests can be set up to eliminate major defects, real quality must be *built* into a product. This may require quality control procedures and operational care that cannot be justified in the competitive production of a tube for entertainment use. For that reason, one must expect to pay higher prices than would result on a low competitive bid to supply regular stock tubes. This fact has not been fully appreciated in connection with much of the equipment that is already in service..

Most of you have seen systems made up of units supplied by a number of different suppliers and perhaps you have been amazed by the assortment of tubes used. A breakdown of the complement of one system employing over 1,000 tubes used four different rectifier types varying only in minor detail where one type would have served the purpose. It also had within it four or five variations of medium mu duo triodes and so on. It was obvious that individual suppliers had preferences for certain tube types and sometimes it seemed that no two had the same preferences. Certainly limiting equipment design to as few types as possible consistent with performance and choosing those types from the Army-Navy Preferred List where possible would go a long way in helping to reduce unnecessary failures.

Inasmuch as events point to the fact that early failures can be eliminated by preburning under operating conditions, there is an increasing tendency to specify that tubes used in vital sockets be given a certain period of burning under full rated conditions before inspection. A 50-hour burning period has been generally specified although there is nothing sacred about this period. Recommendations are being made now that a more realistic approach be taken by establishing a specification calling for the burning period to be sufficiently long to bring the failure rate down to some prescribed point, such as, 1 per cent per 100 hours where a period of 20 hours or 100 hours or even more may be required to produce these results. It is my opinion that this is a step in the right direction and may lead to greater assurances of reliable operation.

As indicated, this testing is primarily a precaution to make the best of the situation that exists. It must be realized that even with the testing, there will be certain percentage of tube failures as there no doubt will be of other components. Therefore, real consideration should be given in design to add additional factors of safety, first by conservative use of tubes, and second by making allowances, wherever possible, for easy and quick servicing of vital circuit elements.

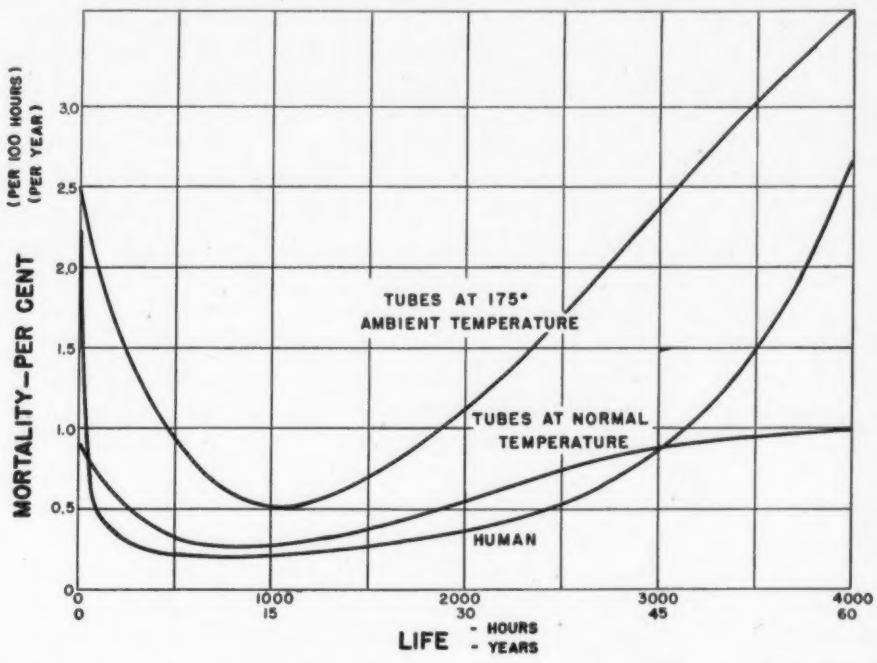


Fig. 3—Mortality curve of tubes operated at 175 degrees C. added to curves of Fig. 1. Failures are considerably increased.

In radio receiver design, it is common practice to reduce cost wherever possible and in doing this there is little allowance made for the safety factor in the operation of tubes. The maximum ratings are too often taken as the recommended operating conditions and little serious difficulty results. An rf or if amplifier, for example, is operated at a full 250 volts because that voltage is available. It may also be operated so as to depend only upon the AVC system and contact potential bias to keep the tube at about the rated current. As a result, these tubes may be operating at several watts plate dissipation where the functions they perform require them to amplify microwatts. It is not surprising then that vital equipment is often designed without taking advantage of the fact that plate and screen voltages could be lowered very appreciably for tubes performing such functions with very little sacrifice in gain and thereby appreciably increase factors of safety and extend the life of such tubes. Also, a thorough analysis of a circuit might show that very high transconductance values with the corresponding close element spacing may not be necessary to procure the performance needed and that instead of limiting the gain by poor transformers, it may be more conservative to use a tube having lower transconductance, but considerably wider element spacing, with more efficient components.

I wonder if we would be in as much trouble today with 6J6's used in bridge or balance type circuits if electron tube engineers had been diligent in pointing out to the circuit designers the inadequacy of this particular design to serve the purpose. Many of you still probably do not realize the 6J6 has a single cathode on either side which is an independent grid and plate. In the conventional tube design, a slight deflection of the cathode from one side of the grid brings it closer to the other side of the same grid so there is some compensation. However, a slight deflection of the cathode of the 6J6 produces just the opposite effect on one-

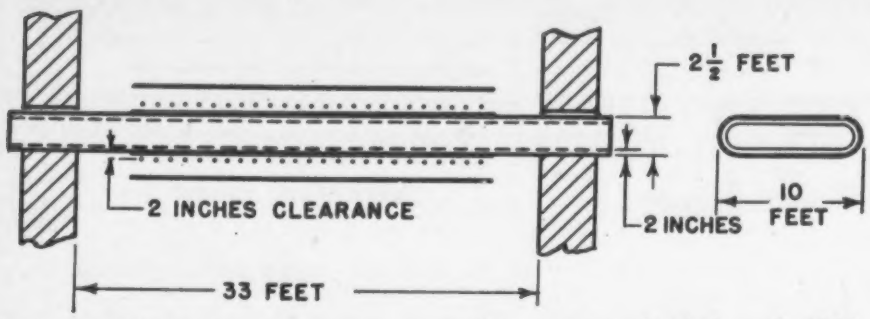


Fig. 4—Comparison of human mortality curves of 1868 and 1941. Great improvements, especially in infant mortality, were made.

half of the structure to that on the other half so that the effect of variations is multiplied by two.

Now for a minute let us just in order to appreciate what might happen in a 6J6 look at it on a 1,000 to 1 scale as shown in Figure 5. On this basis, the cathode might be considered as a flattened tube 33 feet long and 2½ by 10 feet in cross section with the walls about 2 inches thick and supported about 2 inches from grid structures on top and bottom. Furthermore, let us remember that this tube would be mounted on its structure at room temperature, but under operating conditions it would be heated to a cherry red heat. With due allowances, we may now apply the same shock and vibration that is applied to a tube in the type of applications we are considering. If we remember that a variation of only one-half inch would change the spacing on one side to one and one-half inch as against two and one-half inches on the other, we can readily appreciate the parameters with which we are working. Good conservative design, to my way of thinking, would employ either separate triodes or a duo triode of double barrel construction with separate cathodes so that individual cathode resistors could be used and thereby operate in a direction to compensate for variations rather than to magnify them.

Time does not allow the citing of many examples that could be brought up which would make for a greater factor of safety in the utilization of electron tubes. I would like, however, to make this point which was brought out by a man not active in the tube field. He asked the question. "Why do you speak of reliable tubes? You seldom hear of a reliable beam or strut nor do you differentiate bridges by speaking of them as reliable or non-reliable bridges. Do not electronic engineers design factors of safety in their circuits just as a bridge or a building engineer would in his design?"

What I have tried to do is to make a plea that we make the best use of the facilities at hand while striving to make still greater improvements to meet the ever-increasing requirements placed on electronic devices. Much work is now in process to improve electron tube reliability both by the application of sound quality control techniques as, for example, in the ARINC approach and through the improvements of designs incorporated in special ruggedized and subminiature tubes.

In the development of the submarine series of tubes, considerable long term thinking was applied to holding designs to a minimum number of basic types and to concentrate effort upon being able to reproduce them and to simplify over-all processing and quality control by avoiding multiple setups that would be necessary to keep in production a wider variety of tubes differing only slightly in characteristics. I shall not dwell upon each specific type, but do want to emphasize the point that even though in some cases it may be necessary to design more conservatively, a goal of high dependability can most readily be reached if we can avoid letting these few basic types be multiplied into a lot of types that can be justified only because their introduction might eventually take a few cents of cost out of the circuit. It is believed that better performance will be achieved as a result of production studies that are now being made on more uniform production runs. Much emphasis is being placed upon the application of sound quality control techniques in their manufacture.

A further look at subminiature tubes will disclose that they have been designed primarily for low voltage operation. Some of them were designed for 26 volts on plate and screen and others for 100 volts. Again may I point out where tubes are used for amplifying low level signals, it is not essential that their plate voltage supplies should be high. When using lower voltages, there is not only advantage gained in improving the tube reliability, but there is also allowed room for additional factors of safety on other circuit components. I hope these factors of safety will be utilized as such and not be used as justification for taking chances on appreciably lowered condenser and other components ratings.

There is a third step to any progressive program and that is the one not yet achieved. After eliminating tubes that were not designed to meet the high requirements for dependability now dictated and after thoroughly evaluating improved tubes and utilizing them as effectively as possible through design considerations and optimum operational conditions, we realize we are still short of the desired goal. This is particularly true when it is evident that requirements will become increasingly difficult. Because of this, considerable thought has been given to a more ideal approach which has not yet been achieved, but which can result only after thoroughly analyzing and evaluating the good and bad factors of existing techniques and eliminating the bad while improving upon the good. We know, for example that the conventional grid structures with side rods supported in mica spacers are not ideal. Furthermore, there are limitations to tolerances that can be maintained in present tube designs and too much dependence is placed upon the human element in the assembly and welding of the present structures. Attention is therefore being turned to a structure incorporating some of the strong points of types like the 2C36 and 2C37 which have peripherally supported grids and other elements with suitable spacers all forming a part of one rugged structure. Design attention is being given to the improvement of uniformity by eliminating much of the hand labor and using an increasing number of machine operations. It would be well in the development of such a new approach if circuit engineers would give serious thought to designs which would allow for a very minimum number of simple basic tube types so that machinery could be set up to turn out tubes with great uniformity. This can be done only if large runs can be made of a few types rather than a multiplicity of setups to take care of variations.

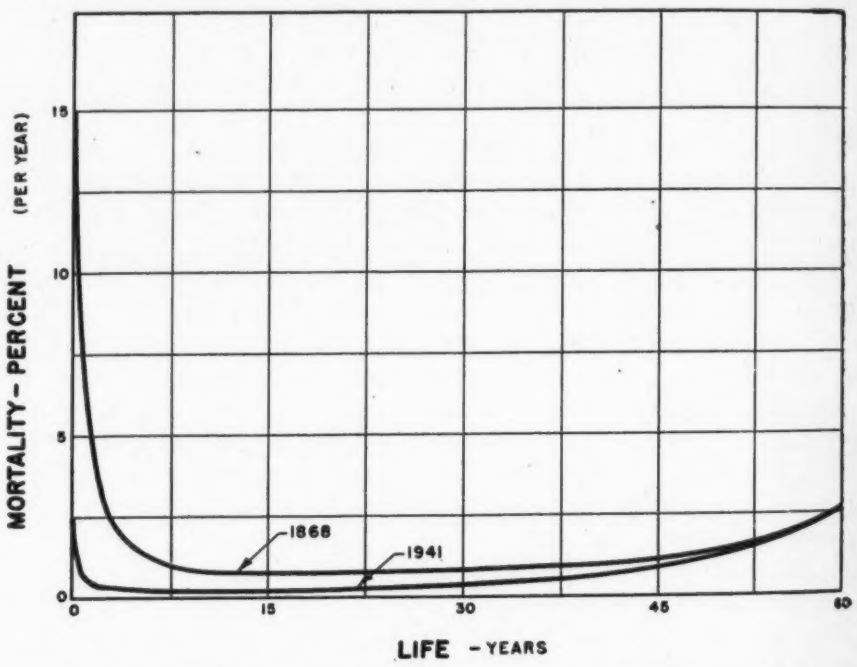


Fig. 5—Type 6J6 with dimensions increased 1000 times for easy comparison with familiar structures. Slight deflection of cathode produces large unbalance of characteristics of the two triode sections.

This is much different from the approach made by the Germans when they manufactured just a few tube types for many uses. They used a complex tube of many electrodes and connected the electrodes together for simple circuit design. While they did achieve standardization, they were still plagued by the many troubles inherent in the use of complex tubes. By using simple tubes many of the difficulties can be eliminated.

I would suggest, for example, that real ingenuity be directed toward finding how universally a well designed grounded grid type triode could be applied to radio ampli-

(*Continued on page 76, col. 1*)

Above: the first Martin "plant," and right, a portion of the present day Martin plant.

Oldest Aircraft Manufacturing Company

Glenn L. Martin

It was in 1908 that Glenn L. Martin rented the old Southern Methodist Church in Santa Ana, California, in which to set up the first Martin "production line" for building his airplane. During the previous year he had built gliders, and even as a child he had fashioned biplane kites which were the envy of the neighborhood, while he dreamed of some day propelling himself aloft on man-made wings.

The Glenn L. Martin Company, the oldest aircraft manufacutring company in continuous operation in the United States and one of the largest, as well, was originated in 1909 in Santa Ana. It was in that year that Mr. Martin completed his first plane and taught himself to fly.

In the years that followed, Mr. Martin fast became one of the world's outstanding airmen. He was chiefly known as a daring flyer who raced against the leading aeronauts of that day—Lincoln Beachley, Howard Gill, Bud Mars, Phil Parmalee, Farnum Fish and others. He was the idol of the Panama California Exposition crowds; he carried a letter from the mayor of San Francisco to the mayor of Oakland across the Bay; and made exhibition flights as far eastward as Iowa. He was among the first to fly airmail as well as the first air express trips (1912); he threw the first bombs from an airplane during Army experiments (San Diego, 1913); he made the first extended over-ocean flight—to Catalina and return, and he set many world's records of flight. In 1913 he made the Army's first training plane, the famous Model TT.

The first of the famous Martin bombers was built in 1918, after the company had moved from California to Cleveland, Ohio. It was known as the MB-1. This was the first twin engined bombardment airplane.

In 1922, Martin built the first experimental night plane; the first American metal monoplane, and the first plane capable of carrying a 2,000 pound bomb. The following year saw the completion of the first all-metal seaplane. The first large plane for aircraft carriers was completed in 1928; and in 1931, the fastest flying boat ever built, up to that time, for the U. S. Navy.

In 1928, when Mr. Martin decided to move his Cleveland, Ohio factory, famous even then as a prime supplier to the U. S. Army and Navy, to Middle River, the plant site was, for the most part, a barren sandy waste guarded chiefly by sea gulls. But it had plenty of potential advantages. It was a location with lots of space for factory buildings and airport, and ample expanses of water for launching and testing seaplanes. Of major importance, it also was only an hour by car and rail and twenty minutes by air from the nation's capital.

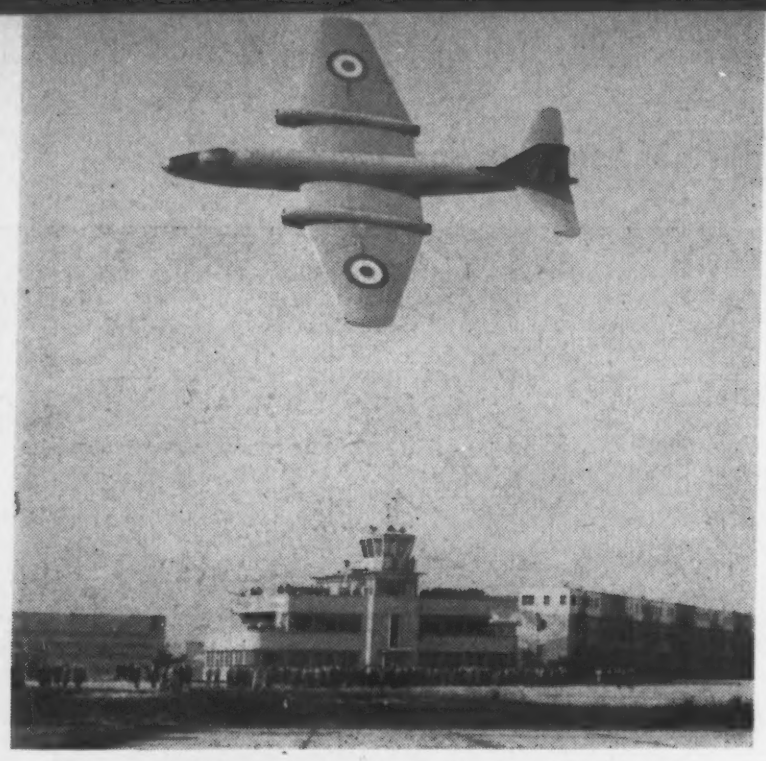
The move was a fortunate one, for the community and for the company—both prospered. The company built some of its most famous airplanes here—the XT5M-1, the world's first dive bomber to successfully carry a 1,000 lb. bomb in a terminal velocity dive; the historic B-10 series, Collier trophy winners; the China Clipper and its sister ships, first aerial conquerors of the mighty Pacific; the Baltimore and Maryland bombers which helped turn the tide of war in Africa and Europe against the Nazis; the rugged PBM Mariners, yeoman workers in the Pacific fighting; the B-26 Maurauders, still revered in the memories of Air Corps veterans; and more recently the huge Mars flying boats, largest in the world and joint holders of many flight records; and the Martin 2-0-2, first postwar twin-engine commercial transport.

The Martin Company was literally growing by leaps and bounds and the years 1938, 1939, 1940 and 1941 saw enormous plant expansions at the Middle River site. When the Baltimore plants were finished, and an additional plant had been completed at Omaha, Nebraska, the company had more than 5,200,000 square feet of floor space.

In January, 1939, the French were requesting that Martin supply them with as many 167 Maryland bombers as possible—as soon as possible. To do this, Martin almost doubled the size of its plant in 77 days. When Paris fell, the British government took over the remainder of the French contract. Then came the 187 Baltimore bomber, a heavier attack bomber.

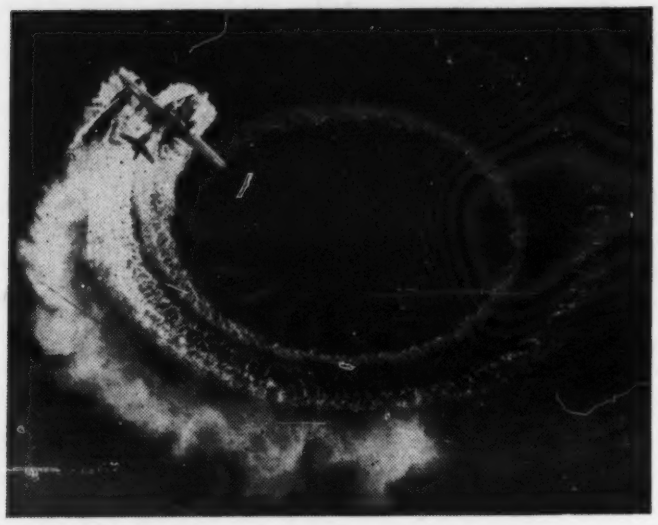
In 1939, the Martin B-26 Marauder won the medium bomber contract of the U. S. Army Air Forces and the first plane was delivered one year later. This swift, tough plane proved to be one of the most effective aerial weapons of the European war and boasts the lowest loss-in-combat record of any of the bombers.

Martin was the first to break ground for war expansion in September, 1940. Its floor space was multiplied seven times that of 1939.



Above, Canberra twin-jet light bomber demonstration for Martin personnel. Martin is to build a night intruder version of the English aircraft.

Below, Martin XP5M-1 being built for Navy demonstrates short radius turn by use of new hydro-flaps developed by Martin engineers.



For the Navy, the plants were producing the famed PBM-Mariner series. They proved particularly vital in Atlantic sub-patrol, as troop-cargo transports and in many other categories.

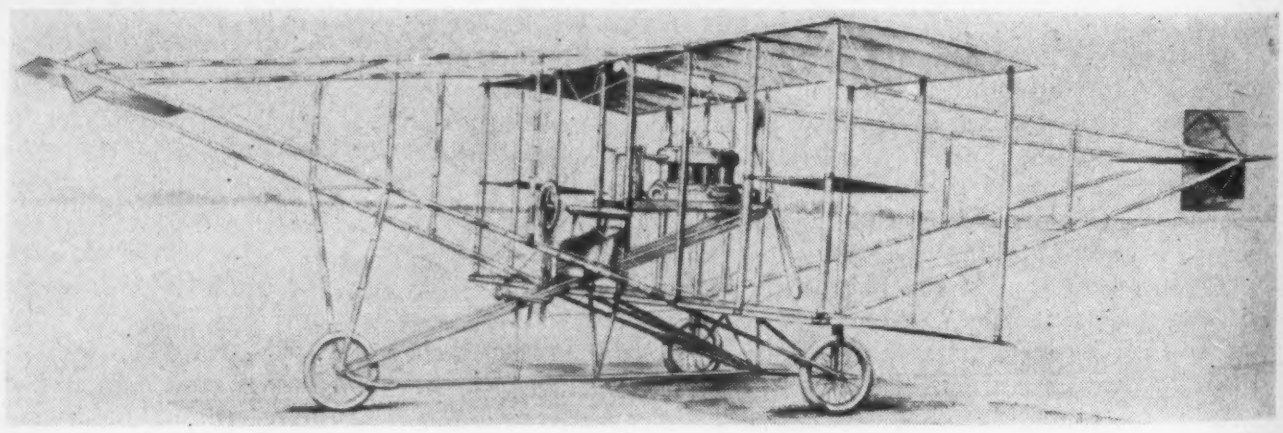
During the war, the Martin Company built upwards of 9,000 military planes of all types for the common cause. However, contributions from the company to scientific development during the years included many things in addition to airplanes. Two devices alone, were to give American air power a definite edge over that of the enemy in World War II. First was the power-operated gun turret, for which the company is held in international respect, and second, the Mareng synthetic rubber self-sealing fuel cell, which is unsurpassed as a safety factor both in military and commercial aircraft.

One of the company's greatest triumphs was the completion of the Martin Mars, the 70-ton flying boat, and the predecessor of the Navy's "Mars" series. She was the world's largest flying boat. Mars flying boats today hold many aerial endurance, and weight lifting records.

Following the close of World War II, The Glenn L. Martin Company continued its production of war planes, notably the PBM-5A, an amphibian version of the PBM Mariner flying boat; the AM-1 Mauler, the Navy's fastest, most powerful torpedo-dive-bomber; the XB-48, six-jet Army bomber, one of the largest and most powerful multi-jet bombing airplanes ever built. Among current types at Martin's are:

The Martin XB-51, most radical in design of all the U. S. Air Force's jet aircraft. The XB-51 is operated by a crew of two—pilot and radio operator-navigator. Both are in a pressurized, air conditioned cockpit. The airplane's wings, of approximately 55 foot-span, are swept back at a 35 degree angle. The unusual tail assembly features the horizontal stabilizer atop the vertical stabilizer, a "T" formation. Three General Electric J-47 jet engines provide the power. Two engines are on pylons beneath the fuselage, the third in the rear of the fuselage. Each engine produces over 5,200 pounds of thrust.

Glenn L. Martin's first airplane, built in 1909 at Santa Ana, California. The plane was a pusher type powered by a 30 horse power Eldridge motor.



Below: Glenn L. Martin, pioneer aircraft manufacturer in the cockpit of a Martin 2-0-2 airliner.

Below: Martin's latest, the XB-51, most radical in design of all U. S. Air Force jet aircraft. Wings of 55-foot span are swept back at a 35-degree angle. Three G.E. J-47 engines, each producing over 5,200 pounds of thrust, provide power. Note unusual tail assembly.

Martin P4M-1 Mercator. Photo reconnaissance and mine laying are among the many missions which can be performed by the U. S. Navy's powerful P4M-1 Mercator long-range patrol plane. Although the Mercator looks like a twin-engine airplane, the same nacelles which house the Pratt & Whitney Wasp Major engines also contain Allison J-33 jet engines for additional power and bursts of speed when needed. The long-range Mercator has a takeoff weight of more than 80,000 pounds. Wing span is 114 feet, length 85 feet. Armament of mines and guns weighs over 14,000 pounds. A crew of nine is carried.

Martin P5M-1 Marlin. Newest anti-submarine flying boat for the U. S. Navy is the Martin P5M-1 Marlin, now in production at The Glenn L. Martin Company, Baltimore, Md. Featuring a new type of hull in which the keel is under water from nose to tail, the Martin Marlin is a much more stable airplane on the water than previous seaplanes with a high "step" or break in the bottom. Additionally, the Marlin is provided with hydroflaps, underwater rudders for easier handling, particularly in restricted spaces or near obstructions.

The latest in electronic submarine detection devices is included in the Marlin's equipment, as well as armament for destroying undersea raiders. Powered by two Wright R-3350 compound engines, the Marlin is the successor to the famous Martin PBM Mariner series of seaplanes which saw duty in all parts of the world during World War II. The twin rudders of the Mariners have been replaced by a single tail stabilizer and rudder. A crew of seven is required to fly the airplane, which can also be modified to serve as a cargo or general utility carrier.

Martin B-57 Canberra. It was announced in March, 1951, that the Martin Company would build the Canberra, twin-jet, medium range, high altitude, light bomber for the U. S. Air Force, under license from The English Electric Company.

The Martin-built Canberra will be a night intruder version. Although unusually compact, the airplane has considerable room in its fuselage for fuel tanks and wing-tip tanks can be added for extra long flights. There is, also, ample space in the fuselage for bomb storage. The crew sits in a pressurized cabin on ejection seats.

Outboard of the nacelles are "finger" type brakes for slowing down the plane during a dive without requiring additional trim by the pilot.

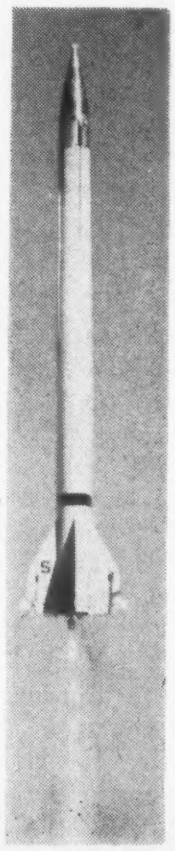
After World War II, the Martin Company also announced its entry for the first time into the commercial transport field, and produced the Martin 2-0-2—a 36-passenger high speed twin-engine airliner.

Trans World Airlines has a fleet of 2-0-2s on domestic routes and South American airlines have operated 2-0-2s over all types of terrain since early 1948, including the lofty Andes Mountains at altitudes up to 26,000 feet. Able to operate from regular airline airports and cruising at high speeds, the Martin 2-0-2 continues to offer express service to many small cities previously served only by older, slower airliners.

The Martin Company developed a larger, more advanced version of the 2-0-2, called the Martin 4-0-4 and in March, 1950, announced sales of it to Eastern Air Lines and Trans World Airlines.

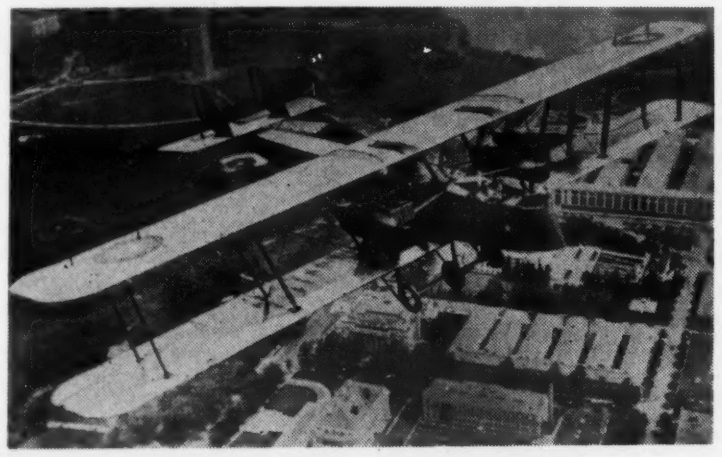
The Martin Company is now working on orders for 103 of the new 4-0-4 airliners, 41 for TWA, 60 for Eastern Air Lines and two for the U. S. Coast Guard. Deliveries are to begin this year. The 4-0-4 will have a gross takeoff weight of 42,750 pounds, of which 10,205 pounds is in payload, including 40 passengers. Power will be supplied by two Pratt & Whitney R-2800-CB-16 engines, each developing 2400 horsepower, with Hamilton Standard reversible, three-blade propellers. Installation of additional Mareng rubber fuel cells will give the Martin 4-0-4 a maximum range of 2,575 miles. Top speed of the 4-0-4 will be 312 miles per hour.

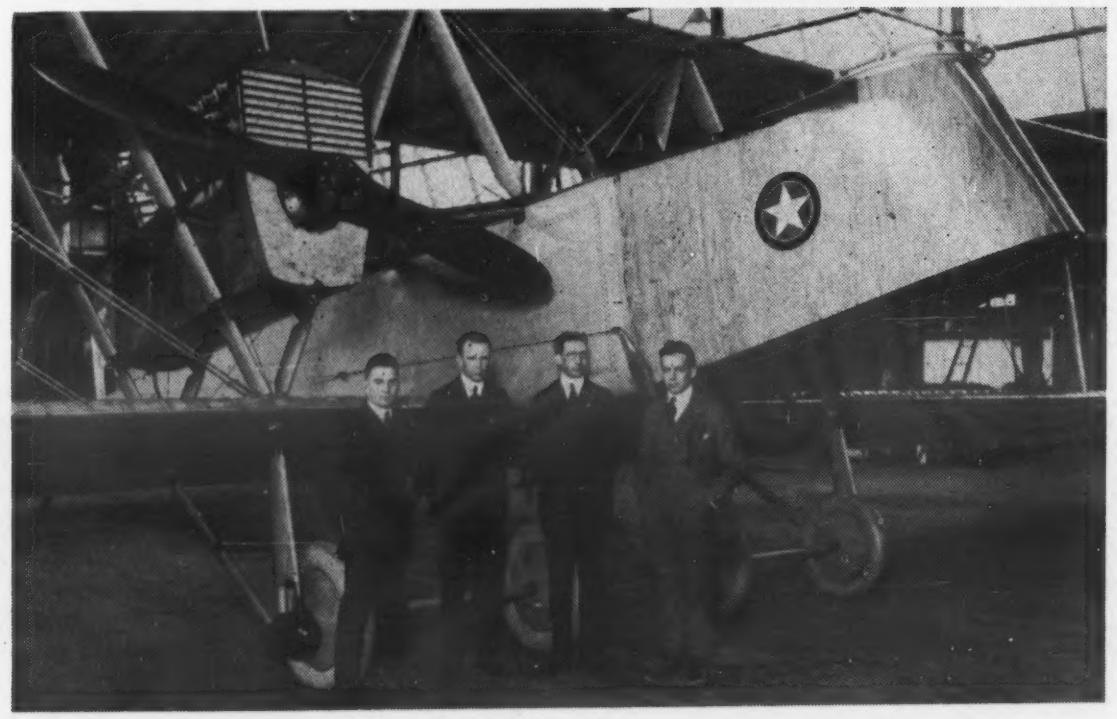
These new aircraft will have every modern comfort for passengers as well as many new design and maintenance features including: pressurized passenger cabins; integral ramps for quicker entrance and exist of passengers; fast, under-wing fueling system; extra large windows; anti-icing



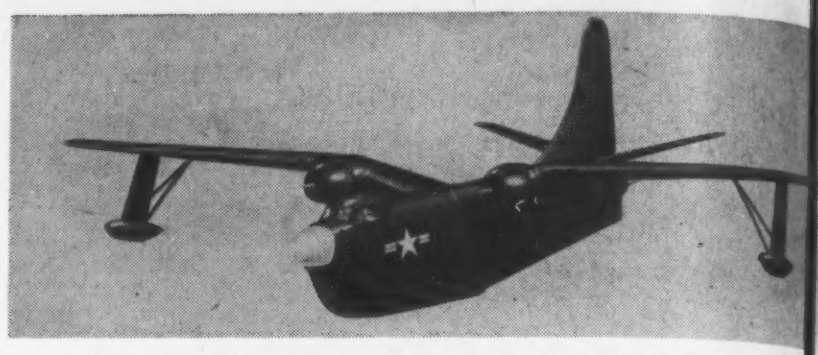
Guided missiles, rocketry, high altitude study, make up a highly important phase of present day Martin research, development, and manufacture. Seen right is the Viking, a high-altitude research rocket being built for the U. S. Naval Research Laboratory, and below is shown the KDM-1 Plover, a pilotless radio controlled ramjet-powered target drone in production for the Navy.

In flight, the Martin MB-2 World War I bomber. Below, posing before the famed airplane of its day, L to R: Lawrence D. Bell, then general manager of the Martin company, now president of the aircraft manufacturing concern bearing his name; Eric Springer, chief test pilot; Glenn L. Martin; and Donald Douglas, Martin chief engineer at the time, and now president of an airplane manufacturing firm of his own name.





Martin P4M-1 Mercator, long-range patrol plane has jet engines for additional power and speed when needed.



Newest anti-submarine flying boat, the Martin P5M-1 Mar is now in production for the Navy.

of wing and tail surfaces and propeller blades.

The Coast Guard 4-0-4 airplanes will generally conform to the specifications of the commercial airliners now under construction at Martin's.

Power for the Coast Guard 4-0-4 will be furnished by two Pratt & Whitney R-2800-34W engines each developing 2400 horsepower. Normal takeoff weight will be 43,000 pounds. Top speed for the airplane will be over 300 miles per hour, with a maximum range at 10,000 feet or more than 2,500 miles. Normal cruising speed will be 260 miles per hour.

In well-equipped laboratories an extremely important phase of Company activities—work on missiles, electronics, high altitude research, rocketry, and telemetering—progresses unremittingly under the supervision of a growing number of the comparatively newer classifications of scientists.

Under military security regulations only two of the pilotless aircraft may be described—the Martin KDM-1 Plover, a target drone; and the Viking high altitude research rocket.

The Martin KDM-1 Plover is a pilotless radio controlled ramjet-powered anti-aircraft gunner target drone in production for the U. S. Navy. It is powered with a 20-inch Marquardt ramjet engine. Wing span is 10 ft.

The KDM-1 is carried aloft by a mother airplane on a pylon under one wing. At proper speed and altitude, the engine is fired and the KDM-1 dropped.

From that point on, the KDM-1 is guided by remote control while being tracked by radar. Control systems may be pre-set, but can be over-ridden at any time by the remote control station.

Upon exhaustion of fuel, the KDM-1 noses up sharply, a parachute is released and the target drops gently into the water over which it has been flying, to be salvaged for further use.

The Martin Viking is a high-altitude research rocket being built for the U. S. Naval Research Laboratory. Ten have been ordered. The Viking has a gross weight of 11,000 pounds, and is 48 feet, 7 inches long—about the size of the German V-2. It reaches a maximum velocity of more than 3,500 miles per hour.

Two were launched at White Sands, New Mexico in 1949 and four during 1950. Two of the latter established almost identical altitude records for American designed and built single-stage rockets—106.4 and 107.3 miles.

The first figure was made by a Viking launched from the deck of the USS Norton Sound, missile research ship, in the South Pacific and was the largest rocket ever launched at sea.

A seventh Viking is now under construction.

In the field of fire control, the Martin Company has developed and is building the most advanced electronically operated type of turret, thus maintaining a leadership in that field which was established during World War II when Martin built more turrets than any other manufacturer.

In other fields of specialized research, spectacular successes have been had in a number of instances, and following an established policy many developments have been made available to industry generally through licensing arrangements.

For example, a featherweight construction, sandwich material, Honeycomb, is already widely used in aircraft, missiles, automobiles, for home panelling and doors and in such

A Mars flying boat takes off with additional kick supplied by JATO bottles.

household articles as tables, chairs and cabinets.

Another important Martin product—one already referred to, is Mareng ("Mar" for "Martin," "eng" for Engineering") cells, the first practical leak-proof fuel cells ever developed. These were originally designed for use in combat planes during the war, where their bullet-proof quality saved many lives and planes, but they are equally valuable in commercial planes, where they reduce fire hazard and fuel loss to a minimum.

Still another research development is "MHC" hard coating for aluminum, which makes this light metal eligible for the first time in many applications heretofore monopolized by steel alloys.

It has been necessary, until now, to resort to other metals for structures requiring high wear-resistance. Standard tests reflect the new coating's remarkable resistance. "MHC"-processed aluminum shows only half as much wear as cyanide case-hardened steel.

Today, The Glenn L. Martin Company is ready, in fact has already begun, to use its well-developed muscles, in the national defense effort to preserve the peace.

The plant is located at Middle River, Md., on Eastern Avenue, about twelve miles east from Baltimore, Maryland. It has a wholly owned plant, consisting of about forty separate buildings, of which twelve are of major size; 958 acres of land and nearly 2¾ million square feet of floor space.

The plant also has a modern, well-developed airport and runway system, the most modern facilities for the handling of flying boats, and advanced equipment for the structural testing of entire airplanes or components of any size.

The Martin airport has four runways averaging 150 feet in width. The paved portion of the runway paralleling the direction of the prevailing wings is 7,100 feet long. The others are 4,270, 4,600 and 4,135. Airport facilities also include revetments for the safe testing of armament of the military aircraft and gun turrets produced at the Company.

Six parking lots, strategically located, accommodate thousands of automobiles used by visitors and workers.

Some measure of the scope of the manufacturing operation at Middle River may be gained from the random figures on consumption of material. In 1950, the Company used 16,000,000 pounds of metal, 165,000,000 rivets, 480,000 pounds of paper and 18,750,000 square feet of aluminum sheet.

The heating and air-conditioning system serves the equivalent of about 2,500 average homes. Over 1300 telephones are used to service all facilities.

Pioneer Manufacturer For Independents

LEICH

In 1907 the Independent telephone industry was a rapidly expanding business. The use of the telephone was spreading and the industry was reaching out to all sections of the country.

One of the many companies that started to manufacture telephone equipment at this time was the Leich Electric Company. It started in a modest little factory in the town of Genoa, about 60 miles west of the City of Chicago.

Most of the manufacturers who started then have long since departed, but the Leich Electric Company has grown and developed until today it is one of the major manufacturers of telephone and communication equipment. Leich equipment now serves Independent telephone companies all over the United States. All types of telephone instruments, dial, magneto and common battery switchboards, PBX switchboards, harmonic ringing converters and associated equipment are now produced in the modern Leich factory in Genoa.

Telephone equipment is, of necessity, precision-made, dependable and long lasting. It is also important that the manufacturer develop new, improved equipment and it was this ability to develop more efficient apparatus that enabled Leich to grow and take its place as one of the leading telephone manufacturers.

Leich was the first company to bring out a 20-cycle ringing machine operating directly from a 60-cycle circuit. Leich was also the first to introduce a magneto multiple switchboard with electrically restored drops. Another Leich development was a non-tune vibrating type storage battery charger for trickle-charging batteries on railroad right of ways. The harmonic ringing current converter of the tuned reed type is another development in which Leich was one of the pioneers.

Recently Leich has completed two revolutionary equipment developments which have been on the market about three years, and which have been enthusiastically received by the Independent telephone industry.

The first of these is the Leich telephone that can be used for either wall or desk installations without making any changes or additions. The second development is the Leich Dial System, which is a remarkably simplified and adaptable dial switchboard.

Until the introduction of Leich's wall-desk telephone, telephone operating companies had to carry two different types of telephones—one for desk installations and another for wall mounting. Or, they could in some cases use the same telephone, but had to convert it from desk to wall use by using a different case.

All this time, expense and trouble was eliminated by the new Leich 600 type telephone. For the Leich telephone could be set down for desk use or merely turned up and over and mounted on the wall. This unique feature makes it possible for the telephone company to stock but one kind of telephone and yet meet every service requirement. In fact, with this Leich telephone, it is not even necessary to know ahead of time which type of installation the subscriber prefers.

This practical advantage is obtained by a novel hookswitch and saddle arrangement which holds the handset unit and makes the hookswitch operative whether the telephone is set on a table or mounted on the wall.

The same wall-desk arrangement was incorporated into Leich's new No. 900 magneto telephone. This magneto telephone makes

it possible for the magneto exchange operator to purchase new magneto instruments without fear of their becoming obsolete in case he converts his exchange to common battery or dial operation.

All that is necessary to convert the Leich magneto telephone to common battery service is to remove the generator, change a few wires and add a dial blank. This can be done in five or ten minutes with a screw-driver. A dial can be easily added too if that is necessary.

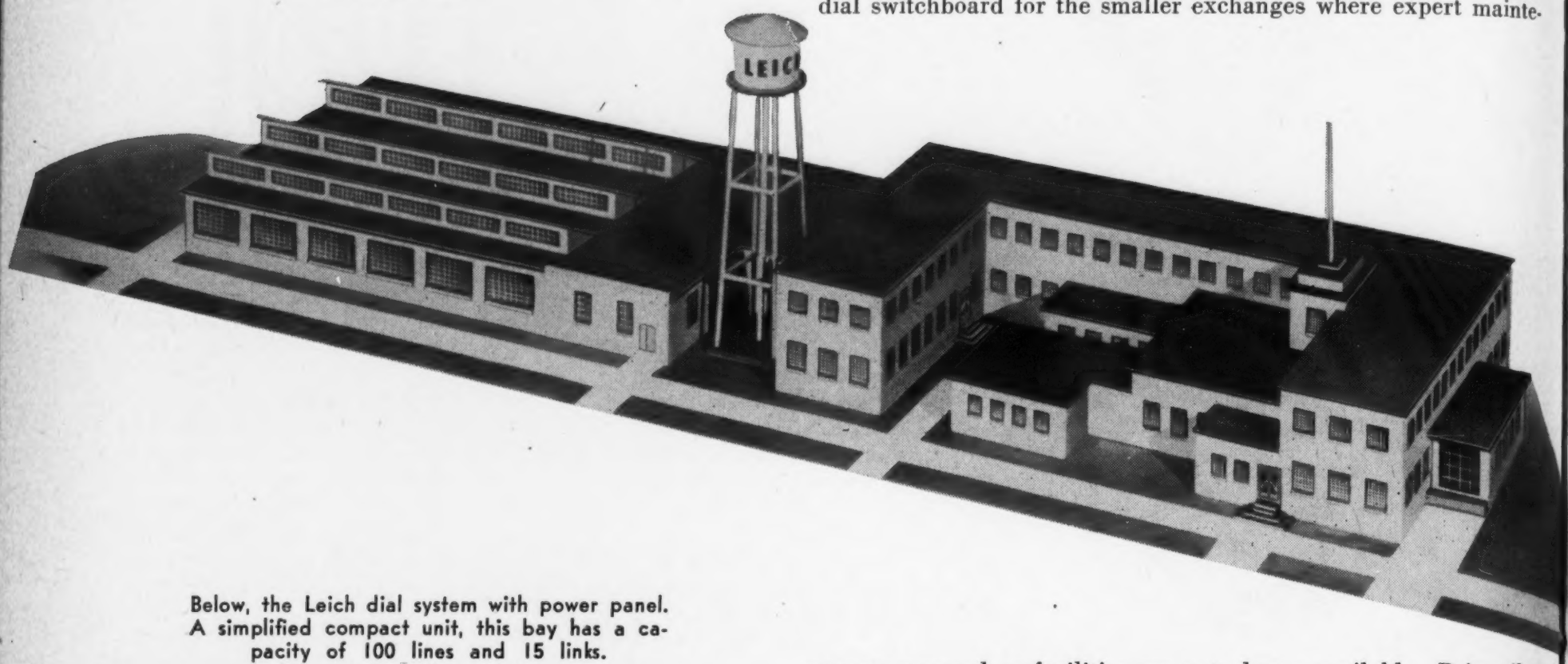
The second Leich development that has been very successful is the Leich Dial System which is Leich's relay type dial switchboard. This dial switchboard was developed with the idea of furnishing a more simplified, easier to understand and operate dial switchboard for the smaller exchanges where expert maintenance personnel or facilities are not always available. Primarily this is a greatly simplified relay type dial switchboard in which relays perform all the operations. Unlike most relay type switchboards it is very simple, quick and inexpensive to make additions. Additional lines are simply jacked-in to the switchboard. Ten lines can be added to the switchboard in less than ten minutes. Links also may be added by jacking in and one man can add a link to the Leich Dial System in an hour or two. There are no connections to solder, no intricate wiring to be done. The switchboard offers all of the modern service features. It comes in 100-line units which may be equipped with any number of lines up to capacity. These units may be expanded by adding other 100-line units. It is also possible to expand it any size required by the use of selectors, which, in the Leich system, are similar to the relay type switches which are used as finders and connectors. Ample linkage is another feature of the Leich dial system. Each 100-line unit has a capacity of fifteen links. The simplified arrangements eliminate many thousands of soldered connections. All the lines in the multiple are connected by stainless steel bars which can be slid out when it is necessary to add links. So rapid has been the acceptance of this new Leich dial switchboard that in the short space of time that it has been in production (three years) over two hundred have been shipped and are in service, and the Leich factory now has many orders ahead of them.

Leich's record in the last war was an admirable one. Leich received the Army-Navy E award twice. The first time they received it, only 3½% of the manufacturers in the United States had been so honored. Leich produced over 43,000 type BD-71 and BD-72 field switchboards as well as wire chiefs test cabinets, rectifier sets, common battery PBX switchboards and small parts. On one occasion, the Leich personnel worked for almost two days straight getting a shipment ready for overseas.

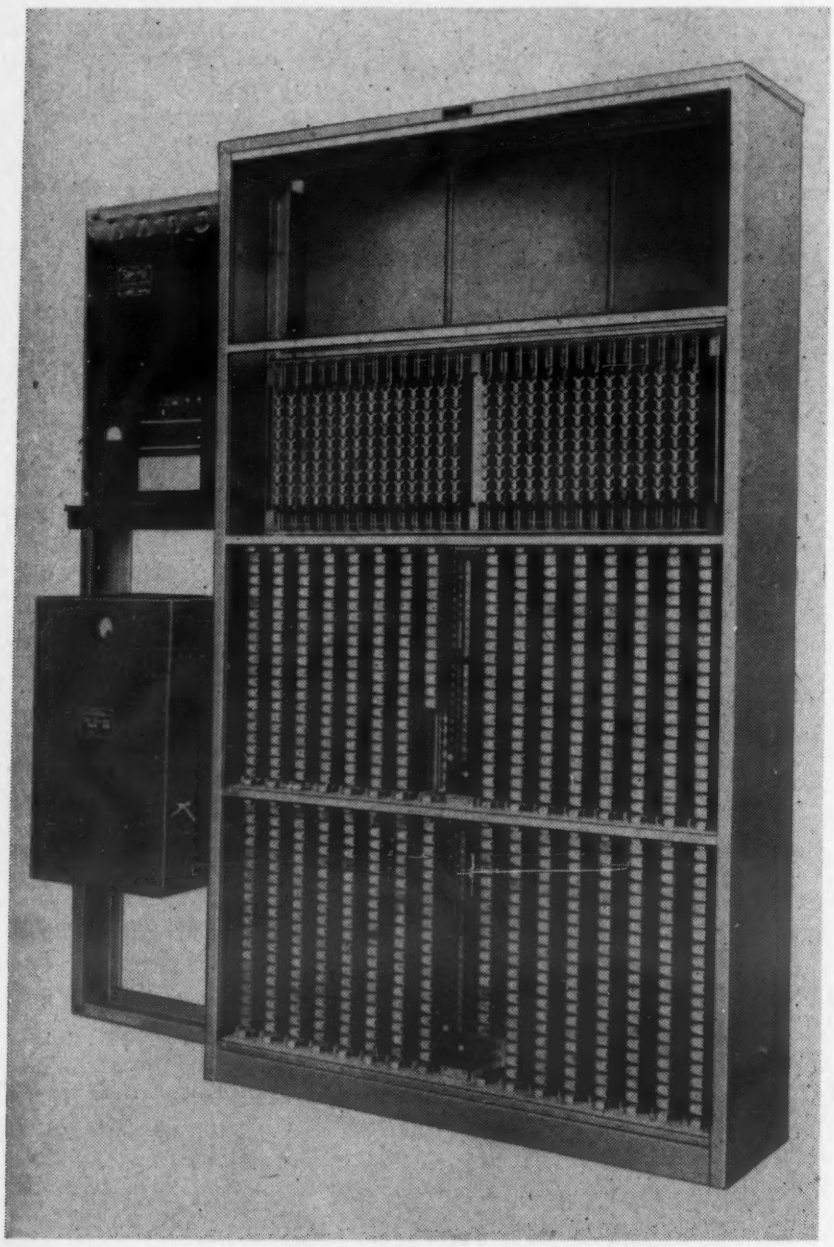
A couple of years ago Leich made an addition to their factory which provided 30% additional floor space and increased their productive capacity considerably.

Leich products are distributed exclusively through the Leich Sales Corporation of Chicago. Leich Sales Corporation also acts as jobbers for a complete line of telephone supplies and construction materials.

Replica of Leich Electric Company factory at Genoa, Illinois.



Below, the Leich dial system with power panel. A simplified compact unit, this bay has a capacity of 100 lines and 15 links.



By E. W. Allen, Jr.

The year 1951 marks the 20th anniversary of Allen B. Du Mont Laboratories, Inc.

Twenty years ago the Du Mont organization existed only as an idea in the young, inquiring mind of Allen B. Du Mont. The major asset was unlimited faith in the cathode-ray tube—then a laboratory curiosity. With this faith was combined the courage and scientific perception to forge this idea into reality.

Today, the company, which got its start in a Montclair, New Jersey basement laboratory, has moved into a top position among the nation's electronics manufacturers. Du Mont products are found in virtually every phase of the electronic and television industry—receivers, transmitting equipment, studio test equipment. In addition, Du Mont electronic parts and electronic instruments are used the world over in literally every branch of modern science and technology. Du Mont's unremitting research into the realm of all things electronic has led to deserved leadership in the electronic field.

From its basement laboratory beginnings, Du Mont now has four major plants and 22 buildings. Two of the major plants are devoted primarily to the production of electronic equipment for military and mobilization use. In addition, Du Mont owns and operates the world's largest television receiver assembly plant and the most modern cathode-ray tube plant. With defense demands for electronic equipment on an increase, these two largest Du Mont facilities are also converting to the manufacturing of a large percentage of military items. At peak production Du Mont employs more than 5,000 men and women, and has an annual productive capacity well over $100,000,000.

From a basement laboratory to leadership in quantity and quality electronic manufacturing in a period of 20 years . . . this is the amazing American "free-enterprise" success story of Dr. Allen B. Du Mont and the company he founded.

In 1931, electronic scanning through the development of the cathode-ray tube was the early Du Mont goal. Du Mont experiments resulted in the refinement and development of such features as electrostatic deflection, screen phosphors, and methods for their application, exhaust techniques for high vacuum, the intensifier electrode, and other electronic achievements. In a word, these cathode-ray tube developments put the company into business.

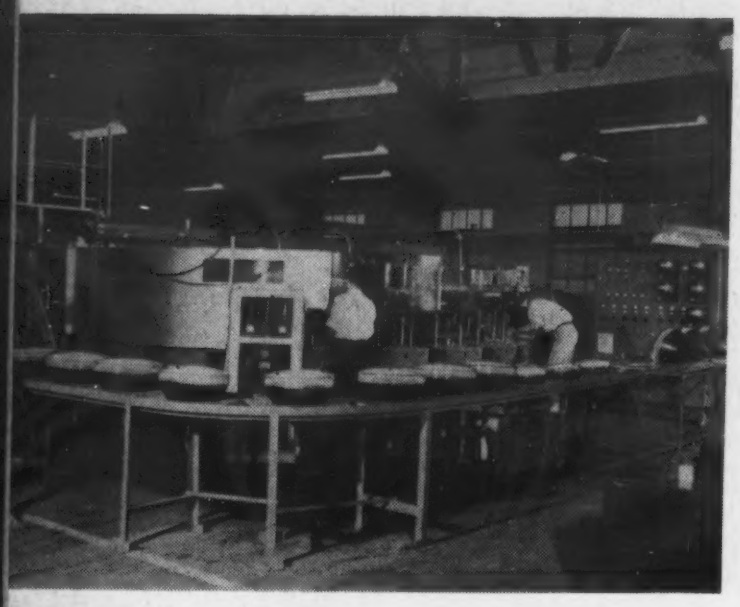
Du Mont produced the first low-cost oscillographs with practical, uniform cathode-ray tubes, in 1932.

Limitations of the early instruments were, of course, severe in relation to oscillographs produced today. However, improvements came rapidly, and, when World War II began, the cathode-ray oscillograph was established as an important laboratory instrument. In less than one decade Du Mont had taken the oscillograph from the realm of a laboratory curiosity and had made it a vital tool of research.

Such rapid advances in cathode-ray tube development also opened the door to commercial television, and in 1939 Du Mont became the first company to make all-electronic television sets available to the public. Du Mont's first oscillographs had three-inch tubes. The first Du Mont TV receivers had 14-inch tubes, thereby beginning a leadership in big screen television that Du Mont still retains. An interesting commentary on the high quality standards set by Du Mont is the fact that many of these early television receivers are in operation today after 11 years of service.

During World War II, Du Mont com-

Below, Du Mont's largest manufacturing facility, located in East Paterson, N. J. Right, reception entrance at the Du Mont home office plant in Clifton, N. J. This building also houses the manufacturing facilities of the company's cathode-ray tube division.



Railroad exhaust machine in which tubes are pumped, baked, bombarded, and their cathodes actuated

Sealing glass funnel to metal cone, first step in production of mamoth Du Mont 30" cathode-ray tube.

Tube assembly. Breakage of one wire in this intricate operation would destine tube for scrap barrel.

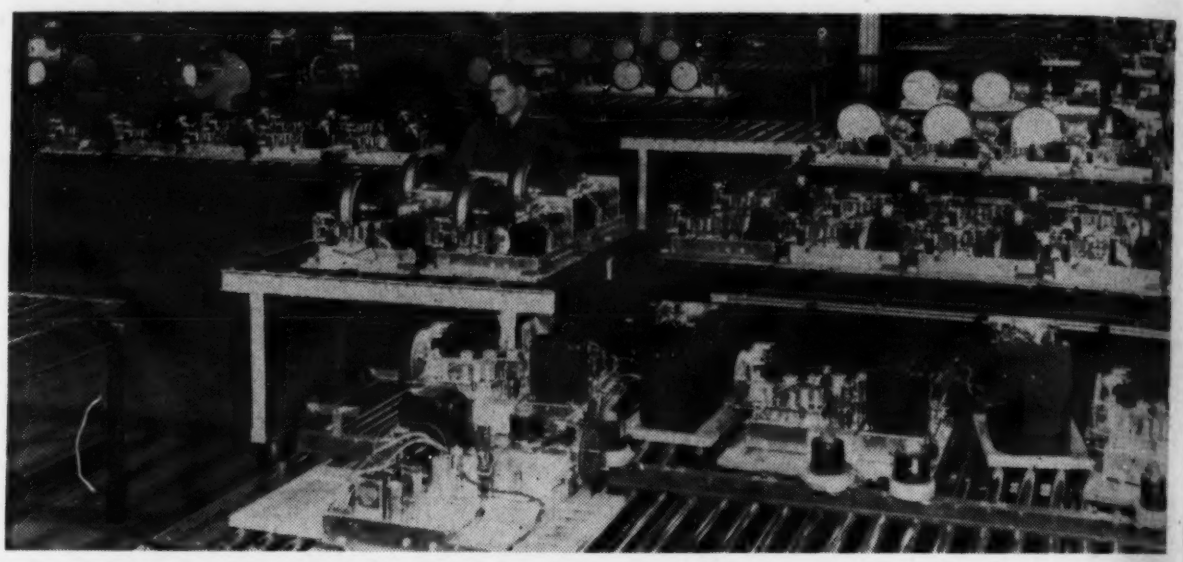
piled an outstanding wartime record of production on cathode-ray tubes, oscillographs, radar, loran, communication sets, and other radio-electronic equipment. The firm was among the earliest to earn an Army-Navy "E."

The intensive program of research and development, coupled with quality-manufacture is responsible for the company's leadership in the industry. New products are constantly being developed in all phases of electronics to fulfill the requirements created by advanced studies and designs.

Du Mont's research division, under Dr. Thomas T. Goldsmith, Jr., continuing the exploration begun by Dr. Allen B. Du Mont, in an ever-widening orbit, has multiplied in personnel, facilities, and equipment. Dr. Goldsmith coordinates the activities of the several departments within the division. Two main projects receiving intensive work are color television and UHF transmitting and reception, in addition to many projects of confidential nature with military and defense implications.

Cathode-ray tube research has made continued progress at Du Mont during the past year. The most notable recent achievements here have been the development of the 30-inch picture tube in a record three months and the new automatic focusing picture tube. Other tube research developments include target tubes, electron devices, special high frequency, high voltage, and multi-gun tubes, as well as tubes with short persistent screens for photography.

Under the heading of general research are two departments mainly concerned with investigations of present and proposed circuits and units for applications to operations of the instrument division, television transmitter division, television receiver division, and the television network division of the company. In this development new circuits are devised for present and proposed equipment and new principles are investigated for application to the electronic science as a whole. This phase of the research operation requires close cooperation with all divisions of the company so that its activities may be changed into useful lines.



Transfer lines feeding finished television receiver chassis to final test and alignment booths.

Two of the four 465-foot assembly lines at the East Paterson Manufacturing plant.

Accomplishing this are Du Mont's manufacturing facilities. Here Du Mont's physical facilities, production capabilities, engineering skill and experiences are combined for the manufacture of products which have gained a top-flight reputation for quality.

Du Mont's largest producing facility is the plant at East Paterson, N. J., 481,134 square feet of floor space having been planned for high speed production of every type of electronic device. Prior to the present emergency, it concentrated upon television receivers and radio-frequency tuning devices. The current production rate, on a single shift basis, is approximately $60,000,000 per year. The plant has four 465-foot canvass belt lines and two ten-foot pilot run lines, and one 200-foot steel slot type of line permitting mounting of jigs and fixtures directly to the conveyor plate. An extensive overhead conveyor system simplifies material handling and also performs a storage function. There are

Allen B. Du Mont

over two miles of overhead conveyor and auxiliary installed. Fifty-five acres of unoccupied and company-owned lands adjoin the plant.

Next among Du Mont's production facilities is the plant in Clifton, New Jersey. This plant presently houses the test equipment, electronic instrument, television transmitter and studio equipment manufacturing groups, and the transformer and special services shop. This building contains 140,000 sq. feet of floor space, and its facilities are producing millions of dollars worth of equipment and gear for military use.

A total of nearly six acres of unoccupied and company-owned land adjoin this unit. In addition to electronic assembly floors, this building contains a service shop which does a considerable amount of the company's sheet metal work and tooling at costs lower than those obtainable from most outside vendors. This group is equipped to do cadmium plating, aluminum etching, tool and die design, as well as chassis, cabinet, bracket, and duct fabrication.

Du Mont's major cathode-ray tube manufacturing plant is also located in Clifton, New Jersey, and is the home of the company's executive offices. This plant has an area of 180,416 square feet, and current tube production exceeds 20 million dollars annually, primarily large screen sizes greater than 12 inches. This plant is the most modern of its type in the world with every new improvement for personal safety, convenience, and efficiency of operation. The plant has 1,997 feet of overhead conveyors and 2,016 feet of roller conveyors. Its buildings occupy 3½ of the total 27 acres. The site also includes a powerhouse, full parking facilities, and an eleven-car railroad siding.

Du Mont's Passaic plant houses Du mon's research division and the tube development laboratory, which acts as a pilot run shop for special cathode-ray tubes and similar devices. It has an area of 107,836 feet and constituted Du Mont's principal facility during World War II.

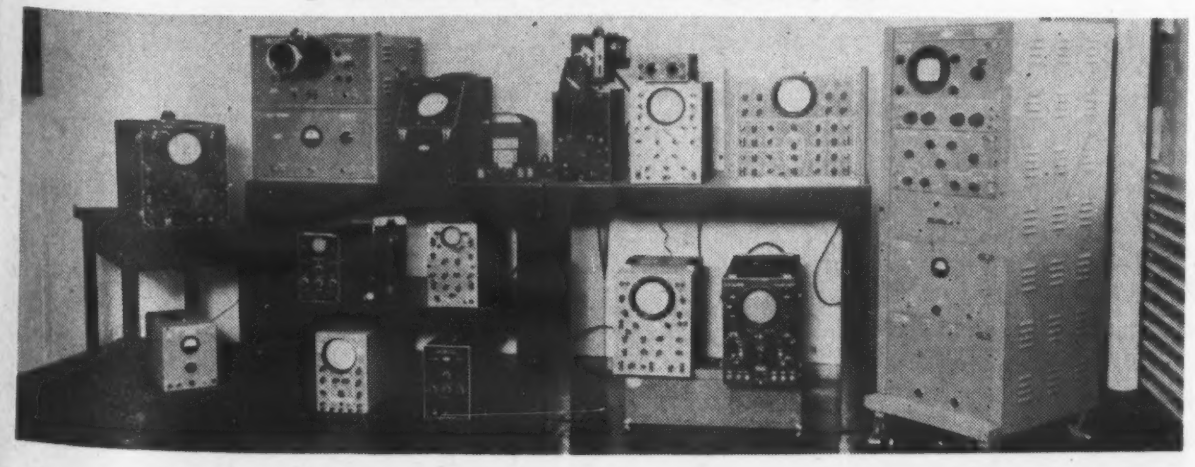
Section of the signal circuits laboratory in the Du Mont engineering department.

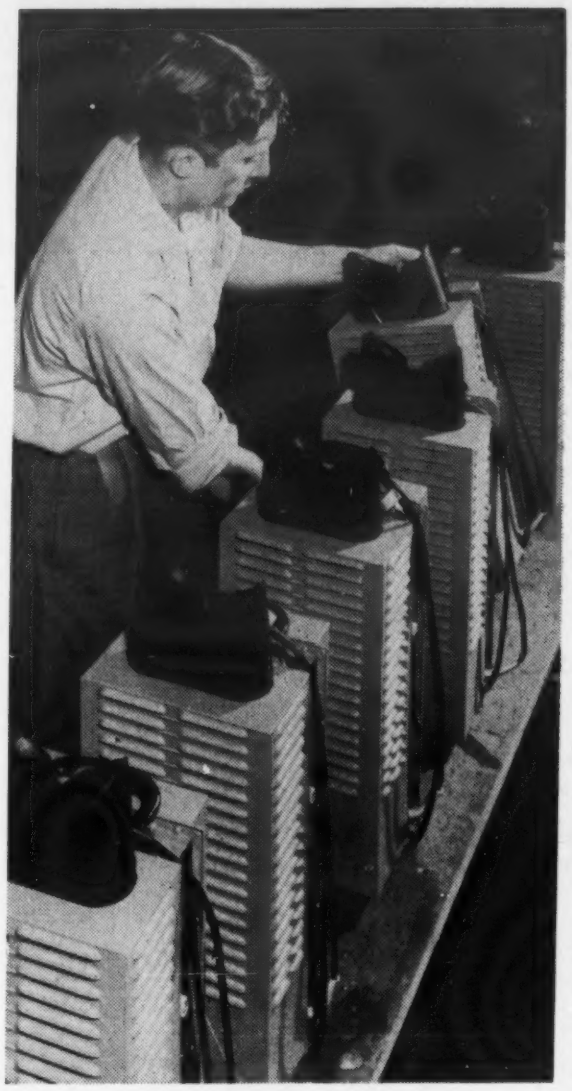
Of general interest are the special services which are part of the Du Mont organization. They include personnel training in all phases of unit manufacture and service operation. In addition, there exist several field service groups within the company to render technical and service aid in the field. Repair depots are strategically located throughout the country.

The television service organization is composed of a staff of 82 persons who have prepared complete service manuals, and an intensive personnel-training program. This group renders periodic technical assistance to Du Mont-authorized receiver-repair organizations throughout the country.

The instrument group maintains a field staff of over 40 men, most of whom

Group view of Du Mont cathode-ray instruments produced commercially for industry, government, and educational laboratory use.





Portable cathode-ray instruments being mass produced for armed services use.

are professional engineers, whose duties include the repair, maintenance, and proper use of cathode-ray instruments.

The transmitter group provides supervision of station installations as well as training of operators on Du Mont equipment in those stations.

Du Mont has had extensive experience in the preparation of technical manuals, tabular lists of parts, and installation drawings in accordance with armed services' specifications. Rather than sub-contract such work, Du Mont established its own instruction book group which handles text preparation, illustrations, schematics, and printing liaison.

The Du Mont television network, first such network to be established in the world, has outlets in most of the major cities in the United States. This phase of Du Mont's activities is extremely important for the dissemination of visual and oral information and mass instruction of the public. The facilities of the network have been used extensively for closed-circuit conferences. This may, in time, become of inestimable value to the various government departments and branches of the armed services.

Du Mont was one of the first electronic manufacturers to participate actively in the mobilization planning program and stands ready at all times to assist the Department of Defense in the production of equipment for the armed services or in their research and development problems.

From The President

Increased membership in the chapters will greatly strengthen AFCA, which as a meeting place for the exchange of ideas will contribute to a stronger America, President Halligan emphasizes. He points with justifiable pride to the recent membership gains made by his hometown chapter — Chicago.

I'm happy to know that in recent months many new members have joined the Armed Forces Communications Association. At the kickoff meeting of the Chicago Chapter in September, thirty new group members and twenty new individual members were welcomed into the AFCA. The meeting, attended by over three hundred people, was highlighted by the appearance of Brigadier General James D. O'Connell, Office of the Chief Signal Officer and Mr. John Hessel, chief, radio communications branch, Coles Signal Laboratory, at Ft Monmouth. We at Hallicrafters were proud to offer our facilities for the occasion.

The enrollment of thirty group and twenty individual members in a one month membership drive certainly is a record for other chapters to go after. Communications, electronics and photographic companies in other sections of the country will be just as eager to join the AFCA as were Chicago companies if the local chapters will turn on a bit more steam. After all, the strength of our Association lies in its members and its chapter activities.

In addition to a bond of good fellowship, the AFCA offers its members, both military and civilian, a meeting place for the exchange of ideas which in future days in many ways will contribute to a stronger and more productive America. For we have to be strong if we are to preserve our freedom against a powerful, aggressive enemy. . . . We must produce more goods than ever before if we are to have the necessary equipment to keep that enemy away from our shores.

Defense Mobilizer Charles Wilson recently announced that the delivery rate of military electronics will triple by next summer. Meanwhile, although the productive capacity for steel, copper and aluminum is being increased, those increases in military deliveries indicate that there will be less production of certain civilian goods in the months to come. Our products, (communications, electronics, photography) lend themselves to a simultaneous flow of government as well as civilian production—a very healthy business condition.

It is extremely important that we continue to dedicate ourselves to the task undertaken by the Armed Forces Communications Association at the time of its founding: to strengthen the cooperation between the armed forces and industry in the fields of communications, electronics and photography. Increased membership in existing chapters and the formation of new chapters will greatly strengthen our Association. Let's all do our part toward achieving that goal.

W. J. Halligan

ARMED FORCES COMMUNICATIONS ASSOCIATION

1624 Eye Street, NW
Washington 6, D. C.
Phone: EXecutive 6991

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Maj. Gen. Kirke B. Lawton, USA*

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Vernon B. Bagnall

Counsel:
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Executive Secretary:
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1952
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Jennings B. Dow
Theodore S. Gary*
E. K. Jett
J. Harry LaBrum
Maj. Gen. F. H. Lanahan, USA
David Sarnoff
W. W. Watts*

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J. R. Cunningham
Walter Evans
T. F. Halloran
Thomas J. Hargrave
Oliver Read
Rear Adm. E. E. Stone, USN

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G. C. Whitaker
Joseph C. Wilson*

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Maj. Gen. K. B. Lawton*
Ellery W. Stone

**Executive Committee Member*
†Executive Committee Member, non-voting

ASSOCIATION AFFAIRS

COMMUNICATIONS • ELECTRONICS • PHOTOGRAPHY

THE AFCA WILL CONVENE FOR ITS NATIONAL MEETING APRIL 24, 25, 26, 1952

Philadelphia

Executive Committee Meeting

The Chicago Chapter's accomplishment in bringing 30 new industry group members into the Association was a highlight of the AFCA's Executive Committee meeting October 30, 1951, at Washington, D. C. Chicago has set a precedent that will be hard to beat, it was brought out, but at the same time the Philadelphia Chapter has announced that it is setting out to do just that.

Members present at the Executive Committee's meeting for the second quarter of the current fiscal year, were Joseph C. Wilson, Rochester, acting chairman of the committee; Frederick R. Lack, New York; Maj. Gen. Kirke B. Lawton, Washington; W. Walter Watts, Philadelphia; and AFCA Executive Secretary George P. Dixon.

Also attending the meeting, as guests, were Commander Everett L. Battey, Office of the Director, Naval Communications; Percy Black, president of AFCA's Washington Chapter; A. Arthur Crawford, of the Southern California Chapter's executive committee; and Brigadier General James D. O'Connell, Office of the Chief Signal Officer.

In one action of the Executive Committee, Colonel Watts was re-elected to his former office as 1st vice president of the Association, replacing Rear Admiral Earl E. Stone who is now on a command assignment in the Pacific area. Colonel Watts had resigned as AFCA 1st vice president upon going on leave from the RCA Victor Corp. to an assignment with the Defense Production Administration. With the resumption of the AFCA office he also becomes national director of chapters.

It was also announced by Executive Secretary Dixon that Major General Kirke B. Lawton had been unanimously elected by the Executive Committee to its membership to fill the vacancy left by Major General Francis L. Ankenbrandt, former Director of Air Force Communications, now on assignment at Air Force headquarters in Europe.

The Executive Secretary proposed that there should be another Washington member of the Executive Committee, since it is very difficult at times to get a quorum of the committee together. Action on this proposal will be carried over to the annual meeting next April. It was decided that in order to make it easier for committee members to plan to be present, a regular time should be set for meetings for each quarter. It was agreed that the meetings will be called for the first Wednesday of the first month following the quarter to be reported on.

In another action, at the suggestion of Francis Colt de Wolf, chief of the telecommunications office of the Department of State, the name of Major General D. A. L. Wade, telecommunications attaché of the British Embassy, was considered for honorary membership in the AFCA. It was unanimously agreed to make General Wade an honorary member, and his certificate and membership card were presented at a meeting of the Washington, D. C., Chapter on November 7th.

During the Executive Committee meeting Colonel Percy Black outlined the action of his Washington Chapter committee in offering a prize (possibly $50) for an article for SIGNAL. He suggested that if proper publicity is given this idea, other chapters will follow suit.

In his report on membership status, Executive Secretary Dixon stated that the Kentucky, Southern California, and Louisiana (New Orleans) chapters have been staging strong comebacks and can be numbered again among active AFCA units. Dayton-Wright and St. Louis also have shown signs of definite activity. Outstanding, so far, among the revived chapters is Kentucky which has achieved a 200% increase in membership.

The new F. E. Warren-Cheyenne Chapter got off to a good start during the second quarter and the Lowry AFB groups will soon be petitioning for their charters. These three, as well as the very active Gulf Coast Chapter, Keesler AFB, are all Air Force sponsored chapters.

Executive Secretary Dixon stated that there has been some question regarding the counting of points for group memberships in connection with the

Chapter of the Year Contest. The Committee expressed a unanimous opinion that the present method was the fairest to all concerned, that is, one new, or renewed, membership to be counted for each of the representatives named by each group. In this way the representatives are actually counted the same as new or renewed individual members.

The recent award of the Association's gold medal to an outstanding amateur radio operator at the Ham Convention in Sioux Falls, S. D., was described by the Executive Secretary. Further awards at ARRL conventions will be discussed with George Bailey, president of ARRL, and a director and Executive Committee member of the AFCA.

Colonel Watts told the committee meeting some of the planning and preparation by his Philadelphia Chapter group for the AFCA national annual convention to be held in Philadelphia April 24, 25, 26, 1952. High enthusiasm in the chapter's convention planning was reported by Colonel Watts, and a determination to make the 1952 meeting outstandingly "the best ever."

1952 Contest — Chapter of the Year

October 31st recorded the following chapters in the lead at the close of the first seven months of the contest:

	Points		Points
Kentucky	16.33	Philadelphia	8.34
Chicago	14.12	Seattle	8.3
Gulf Coast	12.84	Southern California	8.09
New York	10.06	Cleveland	7.88
Boston	8.83	San Francisco	7.57

Over-all chapter activities are at an all time high this fall. An unusual number of outstanding meetings have been held and membership gains have been made by many chapters. Indications are that the competition for the 1952 title will be the stiffest in the history of the contest.

AFCA GROUP MEMBERS

Communications—Electronics—Photography

Listed below are the firms who are group members of the Armed Forces Communications Association. By their membership they indicate their readiness for their share in industry's part in national security. Each firm nominates several of its key employees or officials for individual membership in AFCA, thus forming a group of the highest trained men in the electronics and photographic fields, available for advice and assistance to the armed services on research, development, manufacturing, procurement, and operation.

Acme Telectronix
Admiral Corporation
Allied Radio Corporation
Altec Lansing Corporation
American Cable & Radio Corp.
American Institute of Electrical Engineers
American Phenolic Corporation
American Radio Institute, Inc.
American Radio Relay League
American Steel & Wire Company
American Telephone & Telegraph Co.
Anaconda Wire & Cable Company
A. R. F. Products, Inc.
Andrews Corporation
Argus Cameras, Inc.
Arnold Engineering Company
Astatic Corporation
Automatic Electric Company
Automatic Electric Sales Corp.
Baltimore News Post
Barry Corporation, The
Bell Telephone Company of Pa.
Bendix Radio
Bergsma Brothers
Bliley Electric Company
Breeze Corporation, Inc.
Burnell & Company
California Water & Telephone Co.
Capitol Radio Engineering Inst., Inc.
Carolina Telephone & Telegraph Co.
Central Radio and Television Schools
Chesapeake & Potomac Tel. Co.
Churchill Cabinet Co.
Cincinnati & Suburban Bell Tel. Co.
Collins Radio Company
Columbus Process Co., Inc.
Copperweld Steel Company
Cornell-Dubilier Electric Corp.
Corning Glass Works
Coyne Electric School, Inc.
Croname, Inc.
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Diamond State Telephone Co.
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Dukane Corporation
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Graflex, Inc.
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Hallicrafters Company
Haloid Company
Hazeltine Electronics Corp.
Heinemann Electric Company
Hercules Motors Corp.
Hoffman Radio Corp.
Hycon Manufacturing Company
Ilex Optical Co.
Illinois Bell Telephone Co.
Indiana Bell Telephone Co.
Indiana Steel & Wire Co.
Indiana Steel Products Co.
Institute of Radio Engineers
International Resistance Co.
International Tel. & Tel. Corp.
Jacobsen Manufacturing Co.
James Knights Co., The
Kellogg Switchboard & Supply Co.
Kester Solder Company
Kleinschmidt Laboratories, Inc.
Lavoie Laboratories
Leich Sales Corporation
Lenkurt Electric Company, Inc.
Lewyt Corporation
Lenz Electric Manufacturing Co.
Loral Electronics Corporation
Machlett Laboratories, Inc.
Magnavox Company
Majestic Radio & Television
Mallory & Co., Inc., P.R.
Martin, Glenn L., Company
Merit Transformer Corp.
Michigan Bell Telephone Company
Motorola, Inc.
Mountain States Tel. & Tel. Co.
Muter Company, The
National Company, Inc.
New England Tel. & Tel. Co.
New Jersey Bell Telephone Company
New York Telephone Company
Northwestern Bell Telephone Co.
Oak Manufacturing Co.
Ohio Bell Telephone Co.
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Philco Corporation
Photographic Society of America
Pickering & Company, Inc.
Pioneer Electric & Research Co., The
Precision Apparatus Co., Inc.
Radiart Corporation
Radio Condenser Company
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RCA Victor Division
Ray-O-Vac Company
Raytheon Manufacturing Company
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Willard Storage Battery Company
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Wollensak Optical Company
Zenith Radio Corporation

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CHAPTER NEWS

Chapter of the Year, 1951

SACRAMENTO

President—Paul W. Carrington
Past Pres.—Milton G. Mauer
Secretary—C. A. House

Atlanta

Lt. General John R. Hodge, commanding general, Third Army, stressed the importance of communciations to the combat commander, and Colonel George Dixon, AFCA executive secretary, presented an over-all picture of the Association at the Atlanta Chapter's first fall meeting on October 8th.

The summer membership drive was climaxed by the award of the AFCA gold medal for the greatest number of memberships brought in by a chapter member. As was expected, "Snuffy" Smith who single-handed had captured some 50 members, was the recipient of the award. Ralph Grist of Southern Bell, past president of the chapter and now AFCA representative for the Southeastern area, made the presentation.

P. R. Curry of Western Electric was installed as chapter president to succeed Col. Clyde R. Smith who had resigned due to the increased pressure of duties as acting signal officer, Third Army.

In his talk, Col. Dixon briefly covered the history of the AFCA, one of the oldest associations of its kind, going back to the end of the War between the States when the first U. S. Veterans Signal Corps Association was formed. He traced its progress through the Spanish-American War, up to and through the First World War until after World War II, when the Army Signal Association was formed in May 1946 by Major General H. C. Ingles together with a group of service and industrial leaders interested in communications, electronics and photography.

The association's name was changed to Armed Forces Communications Association in 1947 in order to embrace all three services and more fully to signify its relations both with industry and the military. The executive secretary explained that, "History, in the reading or writing, is often factually dull—its moments of glory and greatness impossible to reproduce in the telling. History in the making is an exciting and all-encompassing thing, moving fast toward tomorrow and the future—which will again make new history. The AFCA is still in the making —you, its components, share in the work and the glory of seeing it become a truly great and important organization."

The Chicago Chapter's current membership drive is dramatized through the use of old Indian scalping methods. Joining in the fun are L to R: W. J. Halligan, president of the AFCA; Lt. Col. Louis German, SC; Brig. Gen. James D. O'Connell; "Chief Big Smoke Signal"; John Howland, chapter pres.; Paul Galvin; Capt. M. Hamm, USN; Col. Edw. O. Earl, SC.

The dinner-meeting took place at the Fort McPherson officers' mess, with 130 members and guests in attendance.

Augusta-Camp Gordon

Augusta-Camp Gordon was the first chapter to feature the Western Union lecture-demonstration, "A Century of Progress in Telegraphic Communications," which has been made available to AFCA chapters by Admiral Joseph R. Redman, Western Union vice president. The lecture was presented by Jack Evans of the company's Atlanta office at the chapter's September 27th meeting.

Mr. Evans, who has served with Western Union for thirty-six years, traced the development of the telegraphic science from Sam Morse's primitive apparatus to such modern equipment as "Desk-Fax" which literally puts the world at the executive's fingertips. Mr. Kayser, a field engineer from the company's Atlanta office, assisted in the demonstration.

At the close of the talk, the Western Union representatives answered questions of a technical nature and displayed photographs of the latest equipment.

A spaghetti dinner was enjoyed by the members and guests after the meeting.

L-R: Brig. Gen. Robert E. Willard, commander of Signal Corps Training Center at Augusta-Camp Gordon; Jack Evans, Atlanta mgr. of Western Union; Lt. Col. Merrill K. Peters, S-3 of the SCTC.

Baltimore

A closed circuit color television of the North Carolina vs. Maryland football game at College Park, Md., featured the "kick off" meeting and social get-together of the chapter on October 20th at the Hotel Belvedere, Baltimore.

Over 100 members and guests of the Baltimore Chapter were present for the "pre-game" cocktails and buffet luncheon. It was a delightful setting for a friendly get-together and everyone enjoyed this first meeting of the season.

Jack Jett, vice president of the *Sun* Newspapers and manager of station WMAR-TV, former president of the Baltimore chapter, had made special

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Parts in circle enlarged about three times. Other parts approximately actual size.

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3. They are dimensionally accurate and strong, though small.

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d. Metal-ceramic combinations which are accurately made and free from strains.

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AlSiMag ceramics have shared in the miniaturization program since its earliest days and played a part in its great advances. Thus, this is not a new and untried material. It has proven its superiority in countless electronic applications over a long period of years. The experience gained in fifty years of specialization in technical ceramics and in miniature sets since their inception is available to you on request.

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NEW ENGLAND, 1374 Massachusetts Ave. Cambridge, Mass., Kirkland 7-4498 • ST. LOUIS, 1123 Washington Ave., Garfield 4959

CHAPTER NEWS

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Atlanta

Lt. General John R. Hodge, commanding general, Third Army, stressed the importance of communciations to the combat commander, and Colonel George Dixon, AFCA executive secretary, presented an over-all picture of the Association at the Atlanta Chapter's first fall meeting on October 8th.

The summer membership drive was climaxed by the award of the AFCA gold medal for the greatest number of memberships brought in by a chapter member. As was expected, "Snuffy" Smith who single-handed had captured some 50 members, was the recipient of the award. Ralph Grist of Southern Bell, past president of the chapter and now AFCA representative for the Southeastern area, made the presentation.

P. R. Curry of Western Electric was installed as chapter president to succeed Col. Clyde R. Smith who had resigned due to the increased pressure of duties as acting signal officer, Third Army.

In his talk, Col. Dixon briefly covered the history of the AFCA, one of the oldest associations of its kind, going back to the end of the War between the States when the first U. S. Veterans Signal Corps Association was formed. He traced its progress through the Spanish-American War, up to and through the First World War until after World War II, when the Army Signal Association was formed in May 1946 by Major General H. C. Ingles together with a group of service and industrial leaders interested in communications, electronics and photography.

The association's name was changed to Armed Forces Communications Association in 1947 in order to embrace all three services and more fully to signify its relations both with industry and the military. The executive secretary explained that, "History, in the reading or writing, is often factually dull—its moments of glory and greatness impossible to reproduce in the telling. History in the making is an exciting and all-encompassing thing, moving fast toward tomorrow and the future—which will again make new history. The AFCA is still in the making—you, its components, share in the work and the glory of seeing it become a truly great and important organization."

The Chicago Chapter's current membership drive is dramatized through the use of old Indian scalping methods. Joining in the fun are L to R: W. J. Halligan, president of the AFCA; Lt. Col. Louis German, SC; Brig. Gen. James D. O'Connell; "Chief Big Smoke Signal"; John Howland, chapter pres.; Paul Galvin; Capt. M. Hamm, USN; Col. Edw. O. Earl, SC.

Augusta-Camp Gordon

Augusta-Camp Gordon was the first chapter to feature the Western Union lecture-demonstration, "A Century of Progress in Telegraphic Communications," which has been made available to AFCA chapters by Admiral Joseph R. Redman, Western Union vice president. The lecture was presented by Jack Evans of the company's Atlanta office at the chapter's September 27th meeting.

Mr. Evans, who has served with Western Union for thirty-six years, traced the development of the telegraphic science from Sam Morse's primitive apparatus to such modern equipment as "Desk-Fax" which literally puts the world at the executive's fingertips. Mr. Kayser, a field engineer from the company's Atlanta office, assisted in the demonstration.

The dinner-meeting took place at the Fort McPherson officers' mess, with 130 members and guests in attendance.

At the close of the talk, the Western Union representatives answered questions of a technical nature and displayed photographs of the latest equipment.

A spaghetti dinner was enjoyed by the members and guests after the meeting.

L-R: Brig. Gen. Robert E. Willard, commander of Signal Corps Training Center at Augusta-Camp Gordon; Jack Evans, Atlanta mgr. of Western Union; Lt. Col. Merrill K. Peters, S-3 of the SCTC.

Baltimore

A closed circuit color television of the North Carolina vs. Maryland football game at College Park, Md., featured the "kick off" meeting and social get-together of the chapter on October 20th at the Hotel Belvedere, Baltimore.

Over 100 members and guests of the Baltimore Chapter were present for the "pre-game" cocktails and buffet luncheon. It was a delightful setting for a friendly get-together and everyone enjoyed this first meeting of the season.

Jack Jett, vice president of the *Sun* Newspapers and manager of station WMAR-TV, former president of the Baltimore chapter, had made special

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UTAH STATE AGRICULTURAL COLLEGE: Logan, Utah.

National Headquarters Chapters Secretary: Julia B. Godfrey

CHAPTER NEWS

arrangements for the show that followed the luncheon. Six TV sets were spaced around two sides of the room, and what proved to be the last colored telecast during the present emergency was shown to the chapter.

The Maryland-North Carolina game proved to have been an excellent choice, as it was a hard fought and fast-moving contest. Maryland won with a score of 14-7, much to the pleasure of the Maryland football rooters viewing the game in complete comfort with no worries as to weather or traffic.

Boston

America's armies are being supplied now with the latest designs in communications equipment, rather than whatever types can be produced most rapidly, said Maj. General Kirke B. Lawton, deputy chief signal officer, in an address before the Boston Chapter on October 24th.

At the start of World War II, General Lawton explained, the armed forces were forced to accept whatever types of radios factories could most rapidly put into mass production, since no time could be devoted to designing equipment which would best meet the needs of the soldier in the field. Now, he said, postwar developments in amplitude and frequency modulation radio —AM and FM—are being incorporated into military sets, and the entire range of field communications equipment has been planned as a unit.

This has been possible, the general emphasized, because funds were granted by Congress for research and development during peacetime years. As a result, when fighting began in Korea, quantity contracts were let, not for World War II types, but for the latest designs. A double saving has resulted, he added, since the services now are supplied with better equipment, and fewer research dollars were spent than would have been necessary had signal units waited until fighting began before contracting for both research and production, as all production facilities were becoming short.

At the conclusion of General Lawton's talk, a Signal Corps Engineering Lab detachment team demonstrated the latest communications equipment, which included the Handi-Talkie AN/PRC-6, the Walkie-Talkie AN/PRC-10, and the portable Teletype AN/PRC-1. A Raytheon Corporation engineer also gave a brief talk on some of the production techniques employed in the manufacture of the AN/PRC-6.

One hundred and eleven persons attended the meeting at the Charlestown

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Lt. Col. Norman Fertig, left, and Rod Lacy, F.E. Warren-Cheyenne-Chapter president display their chapter certificates of charter.

Bostón Chapter meeting sees Signal Corps display. K. B. Lawton, in background, delivered address at meeting.

CHAPTER NEWS

Naval officers club, Boston Naval Shipyard, and the social hour and dinner which preceded. It was one of the most successful affairs held by the chapter to date.

Chicago

Chicago chalked up a record attendance for its first event of the season with 315 members and guests present at the dinner-meeting which was held on September 27th at the Hallicrafters plant through the courtesy of Bill Halligan, Hallicrafters president and national president of the AFCA.

Following a reception for distinguished guests and new members given by President Halligan, dinner was served in the plant cafeteria. Chapter President John R. Howland, Stewart Warner Corp., opened the meeting with the announcement that 26 new group members had joined the chapter in the current membership drive. He welcomed these new members by name and stated that Chicago, with almost 40% of the industry important to Armed Forces communications, now has everybody aboard in truly representative fashion and is well prepared to perform the chapter functions in wider fields of service.

In recognition of the splendid performance of the two membership committeemen charged with the goal of 16 new group members, a target figure almost doubled, President Howland presented to Fleming W. Johnson of J. P. Seeburg Corp. and to Fritz Franke of Hallicrafters the association's gold emblem lapel buttons awarded by national headquarters. Col. Howland also introduced to the meeting the faculty and student guests invited to the chapter meeting from the Illinois Institute of Technology.

The principal speaker of the evening, Brig. General James D. O'Connell of the Office of the Chief Signal Officer, was introduced by Bill Halligan who recalled his first acquaintance with O'Connell during their days at West Point, and stated that the same qualities that made O'Connell captain of the Army hockey team thirty years ago had been well applied in his military service.

General O'Connell opened his remarks with the statement that thanks to industry's ideas, which have been well received by the military, research and development in communications will be up 9 per cent in the coming year. He reported that in interbranch procurement a tremendous job is being done in a very short time, as indicated by $100 million in 1949, $200 million in 1950, $1,350 million for fiscal 1951, and more on order.

Reporting on the communications situation in Korea, both as to U. N. and enemy equipment, he said that according to General Van Fleet communications are superb and better than those of any army in history. Captured enemy equipment is of World War II and later design, with ample evidence of recent development, increased use of ceramics, and better components. We are ahead, General O'Connel said, but nothing could be so disastrous as complacency because improvements move so fast.

After giving the group an account of current emphasis in Signal Corps procurement, General O'Connell stated that improvement in a number of fields was sought, including such matters as shortening the time to get answers in design, obtaining end-items and spares at the same time, speeding up the conversion of letter orders into definitive contracts, speeding action on contractors' requests, and reducing time to process payments on invoices. He summed up his talk by pointing out that the same need for teamwork of infantry, artillery and air forces demonstrated in the field operations applies to industry-military operations in which the AFCA will play a vital part for the future.

Co-featured speaker of the meeting was John Hessel, chief of the radio communications branch of the Signal Corps Engineering Laboratories, Fort Monmouth, N. J. He compared the communications situation now with that at the time of Pearl Harbor, almost ten years ago. Main advance with respect to field forces is the existence now of a planned integrated system of communications, not only up to high headquarters, but between company and platoon. He stated that the largest development contract in 1941 was for $35,000 and that the total budget of that time would hardly support one project today.

Following the talks, the chapter members and guests divided up into small groups for a conducted tour of the Hallicrafters plant. Of main interest to the visitors were the Hallicrafters-built AN/TRC-1 transmitter for the Signal Corps and a newly developed radio teletypewriter installed in a mobile two-way communications station, built by the company for trailer unit operation by the Signal Corps.

After the plant tour, the meeting adjourned in an atmosphere of very favorable comment from many members attending a chapter event for the first time.

Detroit

The first of four meetings on the subject of atomic energy scheduled by the Greater Detroit Chapter, with the cooperation of Professor Lewis N. Holland of the electrical engineering staff of the University of Michigan, was addressed by Dr. Henry J. Gomberg, assistant professor of electrical engineering, University of Michigan, and laboratory director of the Michigan Memorial Phoenix Project.

Dr. Gomberg, who is also the principal investigator for the Atomic Energy Commission project on high resolution detection of radiation, a consultant on isotope techniques to the A. E. C., and guest lecturer to the Oak Ridge Institute of Nuclear Studies, presented an excellent introduction to atomic energy, starting with known forms of potential and kinetic energy and developing the theory from that point. The audience was given an un-

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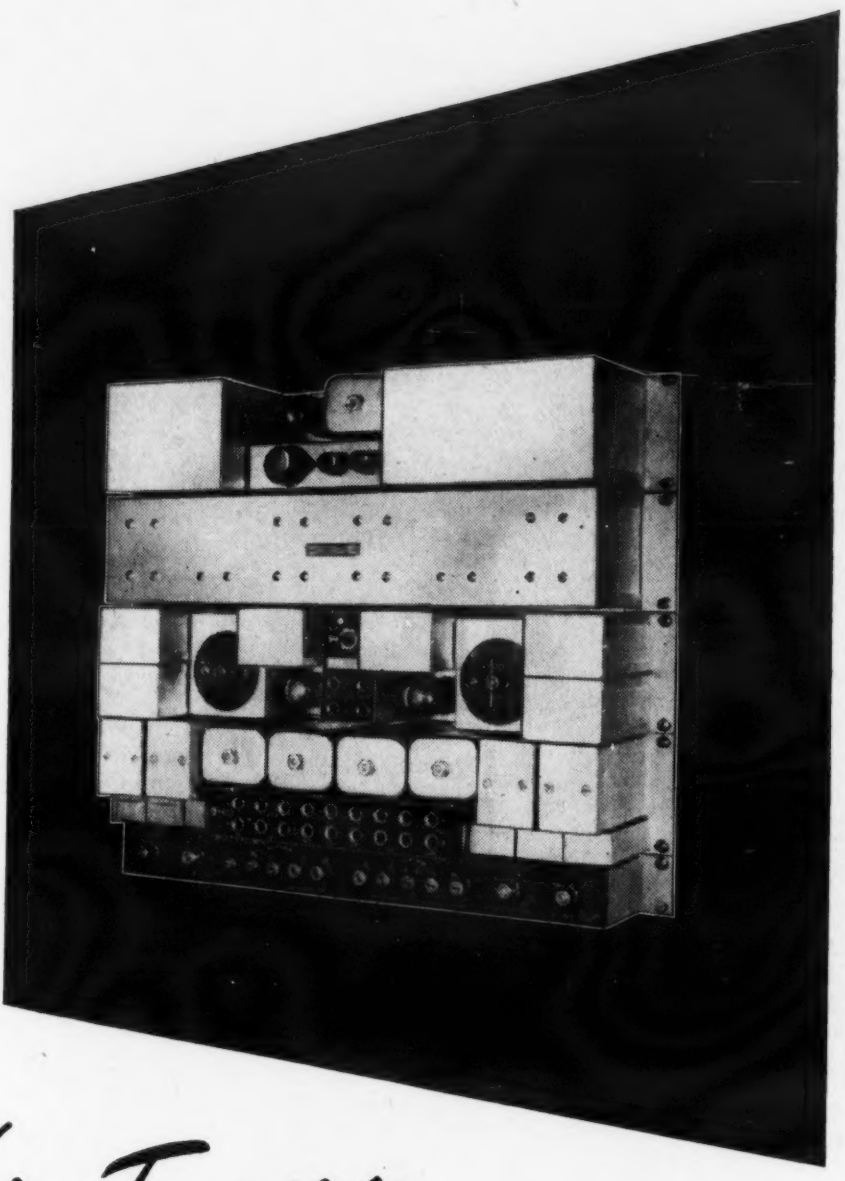

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Brig. Gen. James D. O'Connell, Signal Corps, received a standing ovation at the close of his talk before recent meeting of Chicago chapter.

At Chicago meeting, L to R: AFCA President W. J. Halligan; John Hessell of SCEL, Gen' O'Connell; and Paul Galvin, Pres. of Motorola, Inc.

CHAPTER NEWS

derstanding of the basic particles of matter and the ways by which enormous amounts of energy are obtained from atoms. Dr. Gomberg will follow up with another lecture before the chapter on December 13th when he will discuss "Instrumentation for Atomic Energy" and will review the forms of energy available and cover the mode of interaction of energy with matter and the basic instruments using these interactions.

The third meeting on atomic energy is scheduled for February and will deal with the application of atomic energy techniques to medicine. The fourth meeting will take place in May and calls for a visit to the physics building of the University of Michigan for demonstrations. Intervening chapter meetings will feature communications and photography.

The October meeting took place at the Veterans Memorial Building and was open to the public. A number of chapter members and guests got together for dinner at the Smorgasbord Restaurant in the Hotel Norton prior to the meeting.

Gulf Coast

Guest speakers at the chapter's August 17th meeting were Col. Lawrence C. Sheets of the Air University, Maxwell Air Force Base, Alabama, who spoke on the organization and accomplishments of the university; and Howard O. Lorenzen of the Naval Research Laboratory, Washington, D. C., who outlined the progress of naval research since the founding of the laboratory.

Col. John A. McDavid, chapter president, acted as toastmaster during the dinner-meeting. Captains E. S. Fowler and E. P. Daspit were appointed to the program committee which is headed by Major R. A. Krutz. Major D. M. Mulcahy was appointed chairman of the membership committee, with additional members including Capt. K. N. Harding, J. Wachs and F. W. Toon. Lt. Col. Edwin L. Wood, 1st vice-president of the chapter, said farewell to the chapter preparatory to his transfer to Washington.

Dinner music was furnished by the Airtones from Entertainment, Inc., of Keesler AFB. The meeting concluded with films on the development of the Banshee Jet Fighter and the origination of radio programs.

A most interesting talk on the "Philosophy of Communications" by Lt. Col. John E. Morrison, Jr., Air University instructor from Maxwell AFB, featured the September 14th meeting. A film on communications in "Operation Sandstone" rounded out the program.

Drawing on the talent at Keesler AFB, the chapter was entertained during dinner by a three piece "combo," a ballad singer and a magician.

Kansas City

Plans for the organization of a Kansas City Chapter of AFCA were discussed at a luncheon meeting of local interested people on October 10th. Those present were: C. L. Foster, vice president, Central Radio and Television School; Lt. Col. C. G. Turner, electronics department, General Electric Co.; R. O. Pryor, plant department, Southwestern Bell Telephone Co.; C. H. Latham, Western Union Telegraph Co.; O. H. Huggins, Radio Labs; Lieut. Commander J. S. Walker, communication officer, Naval Air Station, Olathe, Kansas; Capt. Charles I. Eisminger, commanding officer, communications squadron 926, 926th Communications Wing, USAFR.

Additional members are being recruited and it is expected that a petition for charter will be submitted to national headquarters very shortly.

Kentucky

A top-notch meeting on September 28th, marked by a record attendance, launched the chapter's activities for the year. Guest speakers were Brig. Gen. Eugene V. Elder, chief, procurement and distribution division, Office of the Chief Signal Officer; Dr. Maurice E. Strieby, American Telephone & Telegraph Co.; and Col. George Dixon, AFCA executive secretary.

John Hessell, chief, radio communications branch, Signal Corps Engineering Laboratories, Ft. Monmouth, N. J., speaking at Chicago Chapter meeting.

Dr. Strieby, who has appeared on many television and radio programs throughout the country and is recognized as one of the foremost experts on television, presented a fascinating lecture-demonstration on "Television—How it Works and How it Gets from City to City."

General Elder discussed communications in modern warfare and told about the many new things the Signal Corps is doing. He explained that everything in research and development is being done to improve the equipment used by communicators throughout the Army and other services.

An up-to-date report on the association, the activities of its chapters, and plans for the future, was presented by Colonel Dixon. He stressed the importance of chapter organization for, after all, the chapters are the backbone of the AFCA and it is through their members and their meetings that the objectives of the association can best be furthered and maintained.

Chapter elections were held with Col. Harold T. Gallagher, commanding officer of the Lexington Signal Depot, chosen as the new president. Other officers elected are: Harry Bradshaw, 1st vice-president; Austin G. Ruddell, 2nd Vice-president; Merrell Whitmer, treasurer; William Hogge, assistant treas-

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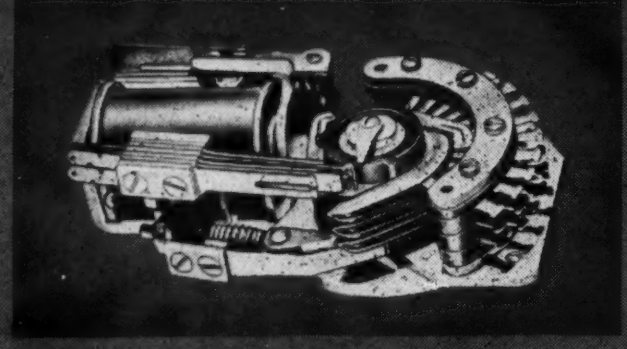

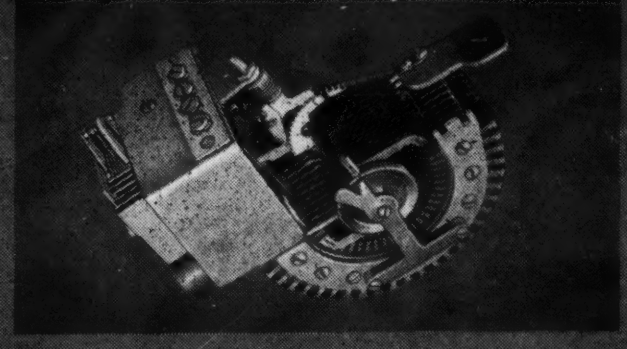

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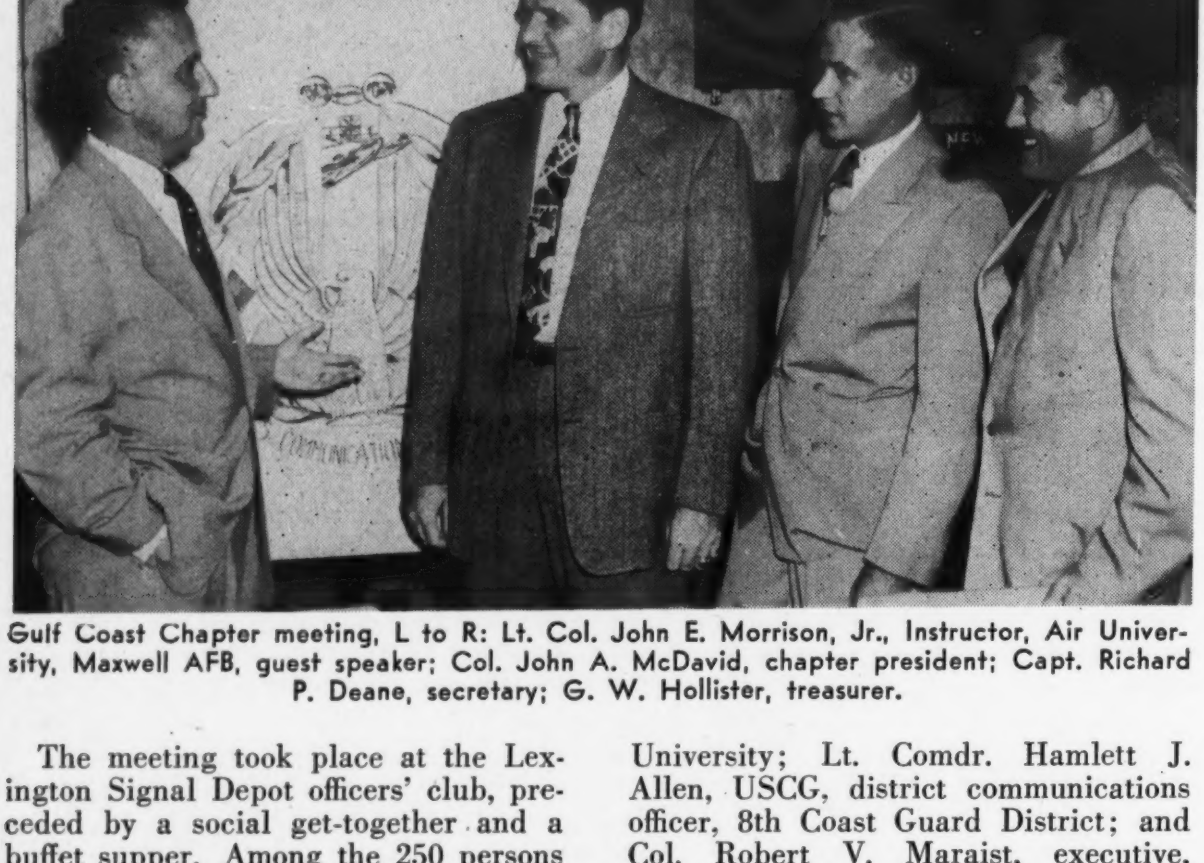
urer; Clyde T. Burke, secretary.

A Signal Corps film, "Voices of Red Korea," showing actual front line interviews with Red Chinese and North Koreans, was cleared especially for the meeting.



Gulf Coast Chapter meeting, L to R: Lt. Col. John E. Morrison, Jr., Instructor, Air University, Maxwell AFB, guest speaker; Col. John A. McDavid, chapter president; Capt. Richard P. Deane, secretary; G. W. Hollister, treasurer.

The meeting took place at the Lexington Signal Depot officers' club, preceded by a social get-together and a buffet supper. Among the 250 persons present was Col. William Mack, past president of the chapter and former commanding officer of the depot, who was given a special welcome by the AFCA members.

Louisiana

The reorganization of the chapter was completed on October 25th with the election of the following slate of officers: president—C. J. Briant, district manager, Metro-Goldwyn-Mayer; vice-presidents (each representative of a portion of the communications-electronics-photography interests in the chapter)—George W. Healy, Jr., managing editor, "Times Picayune"; Thomas A. Taylor, sales manager, Western Union; C. C. Walther, vice president, Walther Bros.; Col. W. S. McCormick, director, 8th Marine Corps Reserve District; Capt. J. R. Moore, USN, district communications officer, 8th Naval District; Rev. T. J. Shields, S.J., president, Loyola University; Col. Byron B. Webb, USAF, commanding officer AROTC, Tulane University; Dr. Joseph C. Morris, executive vice-president, Tulane University; Lt. Comdr. Hamlett J. Allen, USCG, district communications officer, 8th Coast Guard District; and Col. Robert V. Maraist, executive, Louisiana Military District. Chapter Secretary Bruce Hay of Southern Bell Telephone & Telegraph Co., who has directed the reactivation of the chapter, was re-elected secretary.

Plans have already been made for an outstanding meeting on November 20th which will feature a lecture by Dr. Howard F. Van Zandt of the Kellogg Switchboard & Supply Company on "Adventures in Telecommunications in Japan."

New York

A comprehensive story of Coast Guard communications was presented to the New York Chapter at its first meeting of the season on September 19th at the New York Naval Shipyard, Brooklyn.

Rear Admiral Louis B. Olson, commander Eastern Area and commander Third Coast Guard District, reviewed the history and development of communications in the Coast Guard and its relations to search and rescue operations. He also described the various functions of the Coast Guard with reference to marine inspection, accident prevention, methods to promote safety at sea, international conferences and agreements to promote safety at sea, the weather and ice patrols and the inspection of coastal and harbor crafts.

The communications officer of the Third Coast Guard District, Lt. William Donaldson, told of the numerous communications facilities used by the Coast Guard for weather ships, search and rescue operations, communications with small craft, merchant ships and with the armed forces. He cited a number of examples in which Coast Guard communication facilities were responsible for rescuing lives at sea as well as along the coast and described the communications equipment, including loran, mobile equipment for flood and shore disasters and direction finders, used in such emergencies.

Two very effective films were shown to illustrate some of the Coast Guard duties. The first, "International Ice Patrol," told the story of the annual North Atlantic ice patrol by Coast Guard ships and airplanes hunting and positioning icebergs in the sea lanes, and the second, titled "Weathermen of the Sea," showed weather patrols and the means used for gathering and compiling weather information in the North Atlantic.

Rear Admiral Ellery W. Stone, chapter president, opened the meeting with a brief summary of what the Coast Guard means to the safety of the United States Among the 100 members and guests present were Col. George Dixon, AFCA executive secretary, who reported on the national affairs of the association, and Col. Frank E. Kidwell, signal officer, First Army, who was recently elected a vice-president of the chapter.

Philadelphia

Three hundred people turned out at The Franklin Institute on November 1st to hear Rear Admiral Joseph R. Red-

Pittsburgh chapter members tour Hamburg Bros. Mfg. plant at recent meeting.

Sylvester Stoehr, Pittsburgh Chapter president; Mr. Hamburg, host to chapter meeting; Ralph Will, chapter V.P.; Fred Moran, past pres.; E. J. Staubitz, past pres.

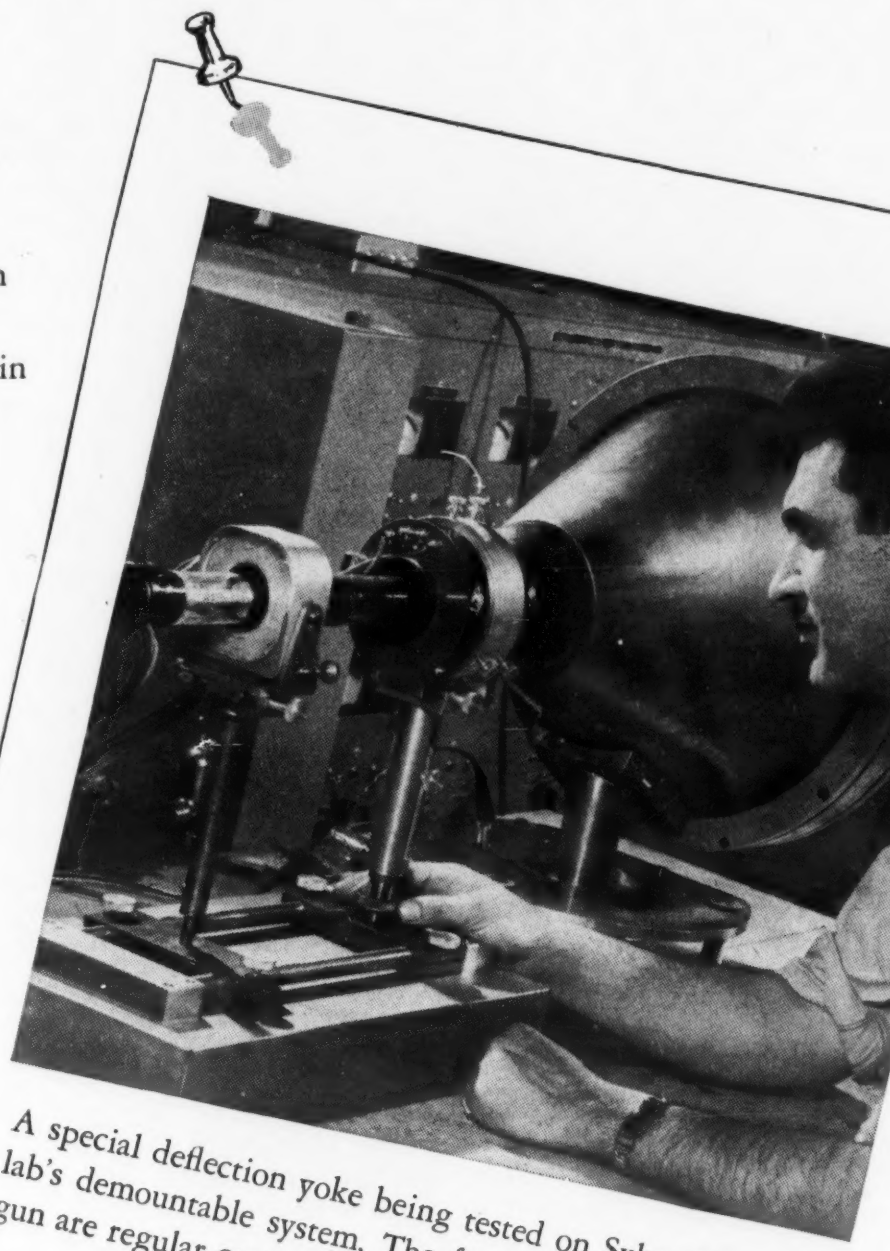
A page from the note-book of Sylvania Research

Sylvania uses "demountable" picture tube in studying electron optics

Fundamental research and development in electron optics at the Physics Laboratories of Sylvania Electric Products Inc. is accompanied by a high order of ingenuity in the creation of test instruments.

For instance, a demountable system, wherein electron guns and electron gun components can be changed rapidly, is used to determine gun characteristics with such gun parameters as aperture diameter, electrode spacings, potentials, etc. Some of the characteristics that may be investigated in such a system are spot size, electron beam diameter and shape, electron lens aberrations, and deflection defocusing effects, etc. A complete and systematic study of the electron optics of guns, including external components such as ion trap magnets, focusing coils, and deflection yokes, is necessary to determine which gun type gives optimum performance for the particular use to which it will be put.

Sylvania research and engineering in all phases of electronics is a basic part of its production of tubes and components for the industry—an unending search for better quality, better performance, better values.



A special deflection yoke being tested on Sylvania physics lab's demountable system. The focusing coil and electron gun are regular components.

SYLVANIA

Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.

TELEVISION PICTURE TUBES; ELECTRONIC TEST EQUIPMENT; ELECTRONIC DEVICES; RADIO TUBES; FLUORESCENT TUBES, FIXTURES, SIGN TUBING, WIRING DEVICES; LIGHT BULBS; PHOTOLAMPS; TELEVISION SETS

Southern California chapter members wearing special glasses for viewing of three dimensional film shown by Col. Goddard.

CHAPTER NEWS

man, USN (Ret.), former Director of Naval Communications and now vice president of Western Union Telegraph Co., speak on "The Air Forces Communications Network."

A full report of the meeting will appare in the next issue.

Pittsburgh

The Hamburg Brothers Warehouse and Manufacturing Plant of Pittsburgh was host to the Pittsburgh Chapter on September 25th, with an inspection and tour of the plant as the highlight of the meeting.

The seventy-three members and guests were welcomed to the plant by Ralph W. Will, sales manager of Hamburg Brothers and vice-president of the chapter. He described the organization and operation of the Radio Corporation of America for which Hamburg Brothers are the distributors in Pittsburgh and vicinity. Stressing the importance of television programs, he pointed out that due to the influence these programs are exerting currently on the younger audience it becomes a civic duty for everyone to take steps to assure that the programs are of top quality.

Mr. Will also gave a resume of the operations of such a large distribution house as Hamburg Brothers to orient the group prior to the start of the tour through the plant. The members were shown the most modern methods of warehousing and the distribution system for communication receivers and allied electrical products, and were also given a demonstration of the sub-contract work on Signal Corps contracts as let by the Radio Corporation of America.

Dinner "on the house" was served to the chapter members and guests in the plant cafeteria through the courtesy of Hamburg Brothers.

Sacramento

The chapter's first meeting of the season was held in the post theater of the Sacramento Signal Depot, with the presentation of the "Chapter of the Year" certificate as the highlight of the evening. The coveted certificate, which had been awarded at the 1951 annual convention of the association, was officially presented to the chapter by C. A. House, chapter secretary, who had attended the convention in Chicago. Chapter President Paul Carrington and Col. Floyd T. Gillespie, commanding officer of the Sacramento Signal Depot. accepted the certificate on behalf of the chapter.

A social hour preceded the dinner served in the mess hall of the 504th Signal Base Maintenance Company. Immediately following dinner, members and guests adjourned to the post theater where they were welcomed by President Carrington who gave an excellent talk on the aims and achievements of the AFCA, stressing particularly the importance of increasing the membership and attendance at meetings.

The results of the recent annual election of chapter officers were announced by Major Clarence M. Godfrey, Army counsel and program chairman of the chapter, who introduced the new officers as follows: president—Paul Carrington; vice-presidents—Robert Livingston, Loran A. Woolf, Waldemar Doyal, C. A. Bairos; executive secretary-treasurer—C. A. House; directors —Joseph J. Healy, Robert O. McCurry, A. R. Tanner, Earl Kemp, Wilbert V. Falck; Army counsel—Maj. Clarence M. Godfrey; Naval counsel—Comdr. Hugo W. Osterhaus; Air Force counsel —Maj. Galen M. Haven.

Two color films, depicting interesting phases of life in the Aleutians and Hawaii, concluded the evening's program.

Special guests of the chapter were James Gerety, Edward C. Cox and M. C. West from the Office of the Chief Signal Officer, Washington, D. C.

San Francisco

The Pacific Telephone & Telegraph Company was host to the chapter at the telephone building in Oakland on September 20th, with Mr. H. L. Deal, vice president and general manager of the PT&T as principal speaker.

The chapter members were guests of the telephone company for dinner and were welcomed by Mr. L. M. Stromberg, division commercial manager, East Bay Division. He introduced those at the speakers' table as follows: Mr. Deal; Col. Lloyd C. Parsons, signal officer, Sixth Army; Capt. C. C. Ray, USN, district communications officer, 12th Naval District; Capt. D. E. McKay, director of Coast Guard Reserve, 12th District; Harry E. Austin, chapter president; and Lt. Col. William G. Damerow, chapter secretary.

Mr. Deal gave a most informative talk on communications in the Bay area. He stressed the importance of common usage of equipment by the telephone company and military establishments, and told of the speed-up in service made possible by the new crossbar toll dialing equipment installed in the building in which the meeting was being held.

At the conclusion of the talk, the audience was divided into small groups and taken on guided tours to see the equipment described by the speaker. Qualified technical personnel made necessary explanations and answered questions.

A nominating committee to select a slate of five candidates for the chapter board of directors for 1952 was appointed by President Austin as follows: Col. H. L. Schnoor, Maj. T. H. Dooling, C. J. Napier, Maj. Thomas Razovich, and W. R. Patton.

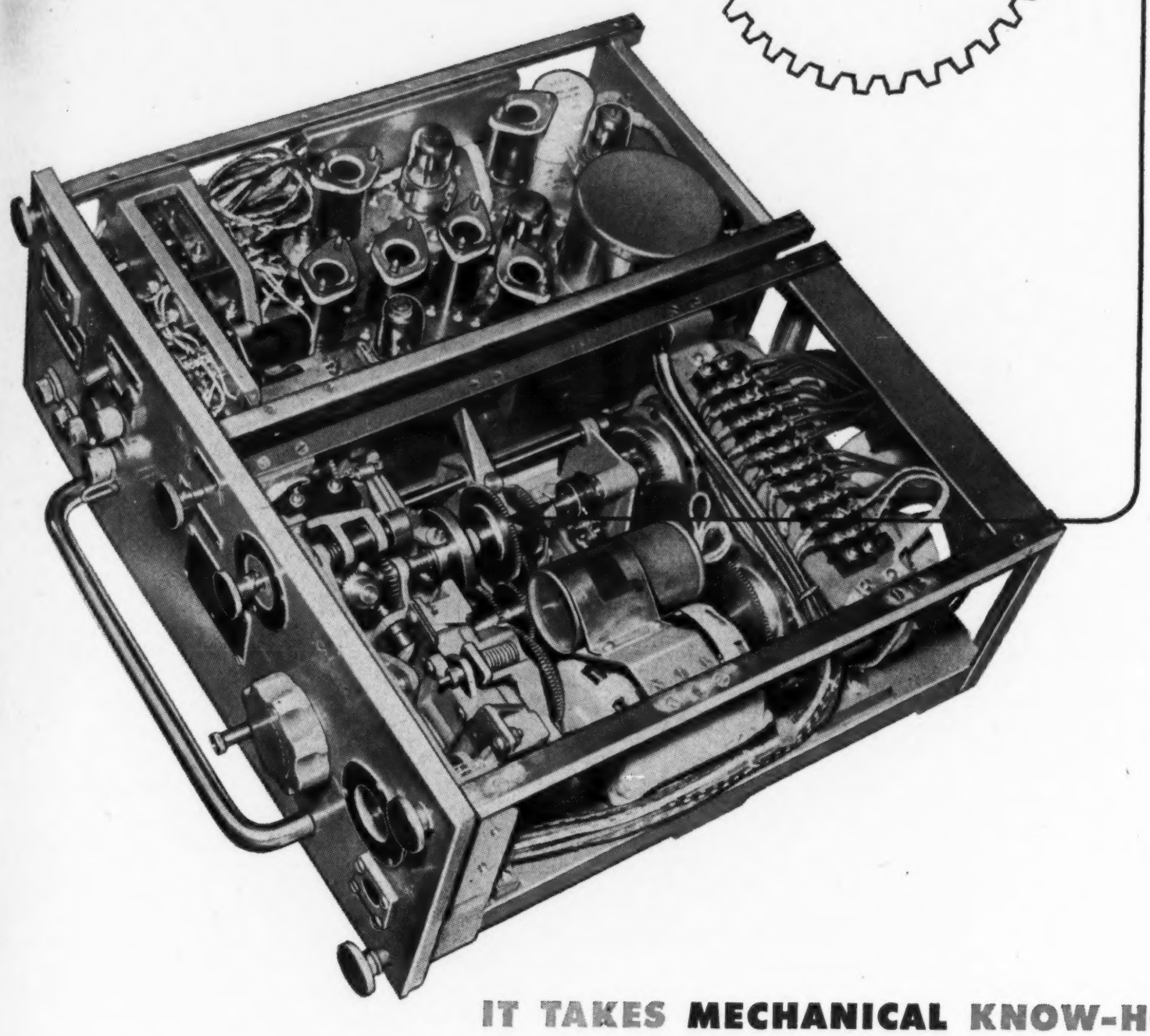
Seattle

"Antennas" was the program subject of the September 12th meeting. Program Chairman Bob Waters of Farwest Trading Co. opened with a brief discussion of radio and antenna fundamentals and Mr. H. E. Larrick of Herb E. Zobrist Co. developed the subject of television antennas with particular reference to the applications and advantages of several types which he had brought to the meeting.

The dinner meeting was held in the Chamber of Commerce Building, with Vice President Frank Keyser presiding in the absence of the president. Treasurer Joe Gregory reported on the accommodations and cost of other suitable meeting places for the chapter but no action was taken to change the meeting place at that time.

Lt. Col. Clarence D. Lawrence, chief of the supply division, ACS, volunteered to act as program chairman for

GEARS MUST MESH



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RADIO CORP.
Los Angeles

Largest Manufacturer of Special Electronic Equipment in the West

Washington, D. C. Chapter meeting, R to L: Fred Guthrie, RCA Communications; Capt. Wilfred Goulett, USN, director, Naval Communications; Francis Engel, RCA Victor, past chapter pres.; Rear Adm. John R. Redman, USN, director, communications-electronics; Joint Chiefs of Staff; Maj. Gen. Raymond Maude, USAF, director, Air Force Communications; Percy Black, Automatic Electric asst. v.p.; Col. G. A. Westphal, USAF, principal speaker; Pres Shivers, Philco Corp.; Brig. Gen. Ivan Farman, USAF, deputy director, Air Force Communications; Maj. Gen. William Reeder, Army General staff; and AFCA Executive Secretary George P. Dixon.

CHAPTER NEWS

the next meeting and arrange a discussion of the Signal Corps procurement program for small business and the Controlled Materials Plan to be presented by members of his organization.

In accordance with these arrangements, representatives of the ACS supply division were guest speakers at the chapter's October 10th meeting. Mr. Schenefield, who has been designated a Controlled Materials Plan representative under the National Production Authority, described the basic setup of the plan and the necessary procedure to follow in applying for priorities on controlled items. Mr. Gunther, who has been designated as a small business representative in the Seattle area, described the operation of the program for aiding small businesses in obtaining defense contracts.

The technical demonstration on the program covered magnetic recording. Chapter President Marshall James reviewed the history and the present state of the art of magnetic recording before introducing Mr. Chet Nolan of the Scott-Nolan Co. who described and demonstrated a Concertone magnetic recorded unit.

Mr. James F. Johnson of the Signal Equipment Co. was appointed program chairman for the November meeting, with the subject to be "Investigation of the elimination of man-made radio interference on Navy ships."

South Carolina

The chapter's first meeting of the season has been scheduled for November 12th in Charleston. The program, arranged by the Kellogg Switchboard & Supply Company, AFCA group member, will present Dr. Howard F. Van Zandt on "Adventures in Telecommunications in Japan."

Details will be reported in the next issue.

Southern California

Some 500 persons attended the October 1st meeting of the chapter to hear an illustrated discussion of the techniques used in modern aerial reconnaissance photography by Col. George W. Goddard, chief photo reconnaissance lab, weapons components division, Wright Air Development Center, Dayton, Ohio. The meeting was open to all interested persons, and special guests of the chapter were members of the American Institute of Electrical Engineers, the Institute of Aeronautical Sciences, Institute of Radio Engineers, and the Society of Motion Picture and Television Engineers.

Colonel Goddard, assisted by members of his staff, first illustrated some of the progress in aerial photographic equipment and showed pictures of modern cameras and lenses. Examples of photographs taken from high altitude with present-day long focal length lenses showed the infinite detail obtainable with this equipment. A discussion of continuous motion strip film cameras was illustrated by photographs taken at speeds up to 500 miles per hour and altitudes as low as 50 feet and showed the accuracy of synchronization between speed of the plane and that of the film.

Colonel Goddard went on to explain the methods used in stereoscopic photography and its uses in advance reconnaissance to present conditions as they would be met by attacking forces and also for the evaluation of bombing targets and results. An extremely interesting display of stereoscopic strip film was then shown and viewed by the audience through the required glasses furnished by the speaker. Subjects shown in this display covered such points as the results of bomb damage in Germany, Japan, and Korea, Korean fortifications, and, last, the recent floods at Kansas City.

The meeting was held at the Institute of Aeronautical Sciences in Los Angeles and the enthusiastic response of the audience attested to its success.

F. E. Warren-Cheyenne

The charter of the F. E. Warren-Cheyenne Chapter was officially presented at the chapter's September 29th meeting. Lt. Col. Norman Fertig of F. E. Warren Air Force Base made the presentation and President Roderich Lacy accepted on behalf of the chapter.

The meeting, held in the Sky Trail banquet room, was primarily a social get-together, and an evening of pleasant fellowship was enjoyed by the 63 members and guests present.

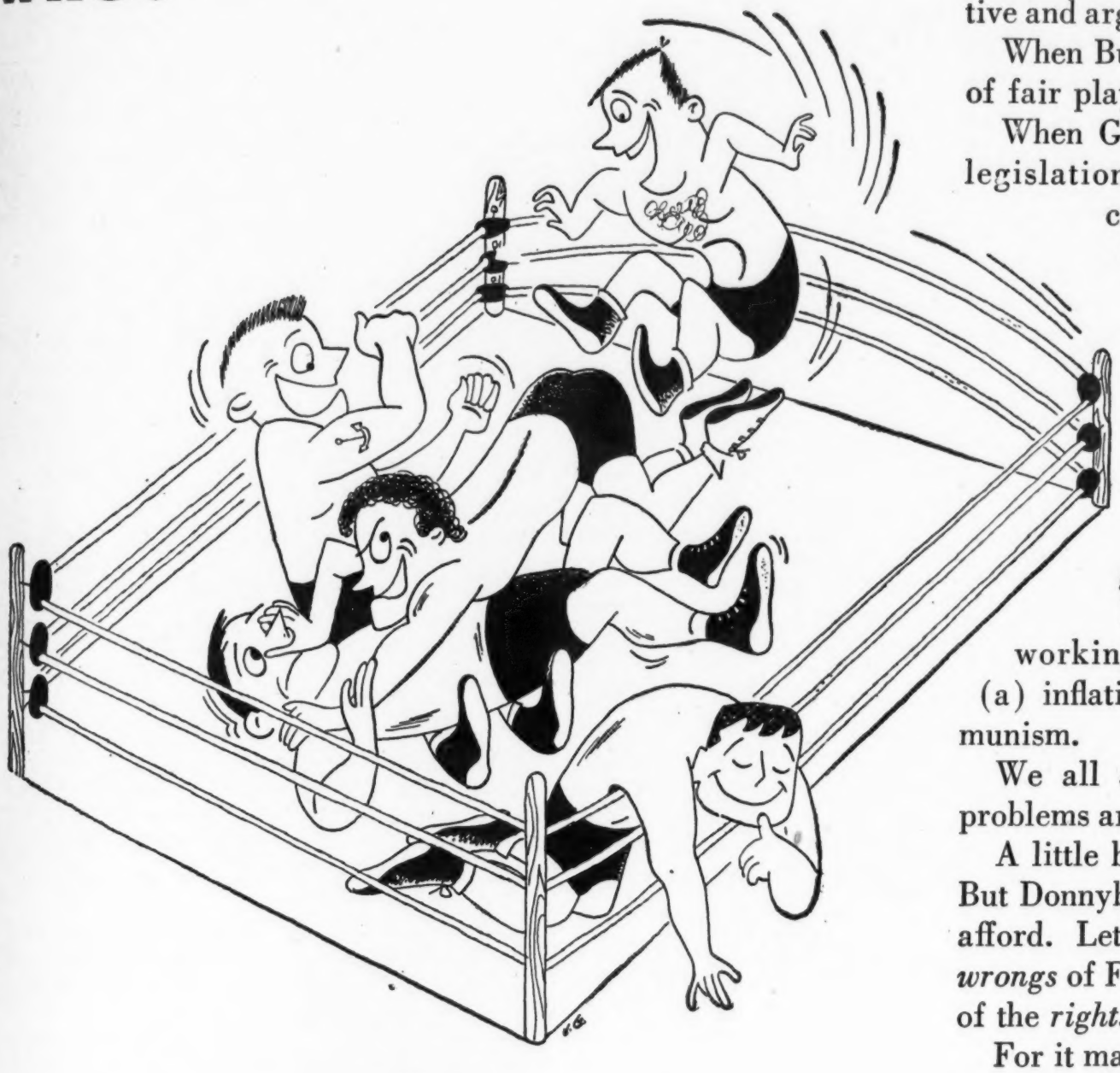
Washington

The national capital chapter opened its 1951-52 season with a meeting featuring Air Force communications-electronics. Major General Raymond Maude, USAF, the new director of Air Force communications, was the guest of honor, and Col. G. A. Westphal of Gen. Maude's office delivered the prinicpal address. The Washington Chapter meeting also took the occasion to greet Rear Admiral John R. Redman, USN, in his new assignment as director, communications-electronics, Joint Chiefs of Staff, and Adm. Redman's successor as director, Naval communications, Captain Wilfred Goulett, USN.

Indicating the continuation of last season's successful meetings, the Washington Chapter's opening meeting, October 3, filled the National Press Club ballroom to welcome Gen. Maude and to hear Col. Westphal's address, which emphasized the often little-realized hugeness of Air Force communications-electronics operations and equipment procurement. (*See News section, this issue, for details of Col. Westphal's talk.*)

The outstanding meetings of the chapter, both of the past, and those indicated for the future, are regarded as resulting from vigorous leadership in the Washington group. Conspicuously active i nthis season's planning and arrangements are the chapter's president, Percy Black, assistant vice president of the Automatic Electric .Co; Pres Shivers, chairman of the program committee, and manager of the Philco Corp.'s Washington office; and W. P. Dutton, chapter secretary, who is in the Washington office of the RCA Victor Corp. Francis Engel, manager of the RCA Victor Washington office, who was the chapter's president last season, also continues to lend support to programming, and other chapter activities.

who's whuppin' who?



These days, when you read the papers, it seems as though Labor has a never-say-die strangle hold on Business. And Business has a vise-like grip on Labor.

And over in the corner, Government is getting into the act to make things as complicated as possible for the other contesting parties.

Aren't we supposed to be fighting something else? Something called the World-Wide Communist Revolution?

When Labor is recalcitrant, vindictive and argumentative, nobody wins.

When Business is adamant, the spirit of fair play vanishes and nobody wins.

When Government passes restrictive legislation, over-spends, over-complicates, and generally intrudes, nobody wins.

(Except, of course, something called the World-Wide Communist Revolution.)

What's happened to the good old American custom of working *together* to get things done?

It will take *all* of us, *all* working together to overcome: (a) inflation, (b) the spread of Communism.

We all agree, don't we, that these problems are paramount. Let's *go*, then!

A little bickering is a healthy thing! But Donnybrooks are a luxury we can't afford. Let's stop carping about the *wrongs* of Free Enterprise and be proud of the *rights* about it.

For it may truthfully be said that our Free Enterprise system today is the hope of the world. It is the bulwark of our own productive, stimulating economic system.

But sure as tomorrow, it won't work—unless we get together and *make* it work.

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SIGNAL NEWS

Communications-Electronics-Photography

Signal Corps Has New Major Center

Lawton To Command Monmouth Reichelderfer At New Center

The establishment of a new Signal Corps major training center, at San Luis Obispo, California, together with major personnel changes was announced by the Signal Corps November 23. The announcement disclosed that Major General Kirke B. Lawton, deputy chief signal officer, will take command of Fort Monmouth, N. J., the Signal Corps' principal training and laboratory installation, and that Brigadier General Harry Reichelderfer, who has been commanding at Fort Monmouth, will command the new California center.

A group of staff officers, headed by Brigadier General Arthur Pulsifer, chief of personnel and training division of the Office of the Chief Signal Officer, was scheduled to arrive at San Luis Obispo on November 27 to prepare for opening the camp and to acquaint local civic officials and the community with plans for the post. An advance party was to arrive at the new training center on December 1, with other troops and personnel to follow as soon as possible. A rapid build-up of the personnel and training center and school at Camp San Luis Obispo is said to be planned, to bring the California installation up on a level with Fort Monmouth and Camp Gordon, Ga., in training activities and strength.

General Lawton, who was to take over command of Fort Monmouth sometime in December, has been deputy chief signal officer since April 1948. He served in Europe in World War II with Supreme Headquarters Allied Expeditionary Forces, and prior to that had served in the Office of the Chief Signal Officer in the war plans and training division, and as chief of the fiscal, administrative, and Army Pictorial Service divisions. After World War II he served again as chief of the fiscal division, and held that post until being appointed deputy chief signal officer. In these posts General Lawton is regarded as having gained a most distinguished record. He has won high regard from Congressional committees, particularly the Senate and House appropriation committees, in representing the Signal Corps in hearings, especially on its budget matters.

For General Reichelderfer Camp San Luis Obispo will be the second new Signal Corps installation he has taken command of to build up to major status. Three years ago he went to Camp Gor-

(*Continued on page 62*)

Charge of Excess of Generals and Admirals Should Not Apply to Communications-Electronics-Photography Service

(Editorial from *Telecommunications Reports* for Nov. 19, 1951)

The charge of the Senate Preparedness Subcommittee that there are far too many generals and admirals serving in the Pentagon should not be applied to the Army Signal Corps, the Air Force Directorate of Communications, and Naval Communications. Because the Senate Subcommittee, in the report of Chairman Lyndon Johnson (D., Tex.), said there were on duty in the Washington area, as of Sept. 30, 361 generals and admirals—only 36 less than at the peak of World War II—*Telecommunications* reviewed the situation in connection with the military services which direct the communications-electronics functions of the three armed forces.

The Army Signal Corps, which has the broadest command functions and responsibilities of the three communications segments of the armed forces, has only one major general, the Chief Signal Officer, and three brigadier generals on duty in the Pentagon—another major general who has been serving as deputy chief signal officer is due to be assigned to the command of Fort Monmouth, N. J.

The Directorate of Air Force Communications has just one major general, the Director, and a brigadier general, the deputy director, while the Airways and Air Communications Service (AACS), a part of the Military Air Transport Service, with headquarters at Andrews Air Force Base outside of Washington, is commanded by a brigadier general.

The Director, Communications-Electronics, Joint Chiefs of Staff, is a rear admiral who formerly was Director, Naval Communications and he was succeeded by a Navy captain at the helm of Naval Communications.

In the research-development and procurement functions of the Air Force, concentrated at Wright Field, Dayton, O., the former chief of the electronics division was promoted from colonel to brigadier general, and was given the broader responsibilities of heading the engineering functions of the Air Force Materiel Command. In the Navy, captains head the Bureau of Aeronautics Electronics Divisions.

The Army Signal Corps traditionally has had broader functions and responsibilities than the other armed services' communications organizations. In addition, the Signal Corps has charge of the Army Pictorial Service.* The Signal Corps also supplies the Marine Corps with most of its communications and radio equipment, because many of the Marines' requirements are similar to those of the Army's infantry, artillery and armored forces.

The present traffic of the Signal Corps' world-wide administrative and command communications system is even larger than during the peak of World War II, the traffic handled over the Alaskan Communications System has been steadily increasing, and the specialized training of military personnel by the Signal Corps has also been greatly enlarged at its training centers. The Signal Corps Engineering Laboratories at Fort Monmouth are, of course, outstanding centers of military research and development in the communications and electronics fields.

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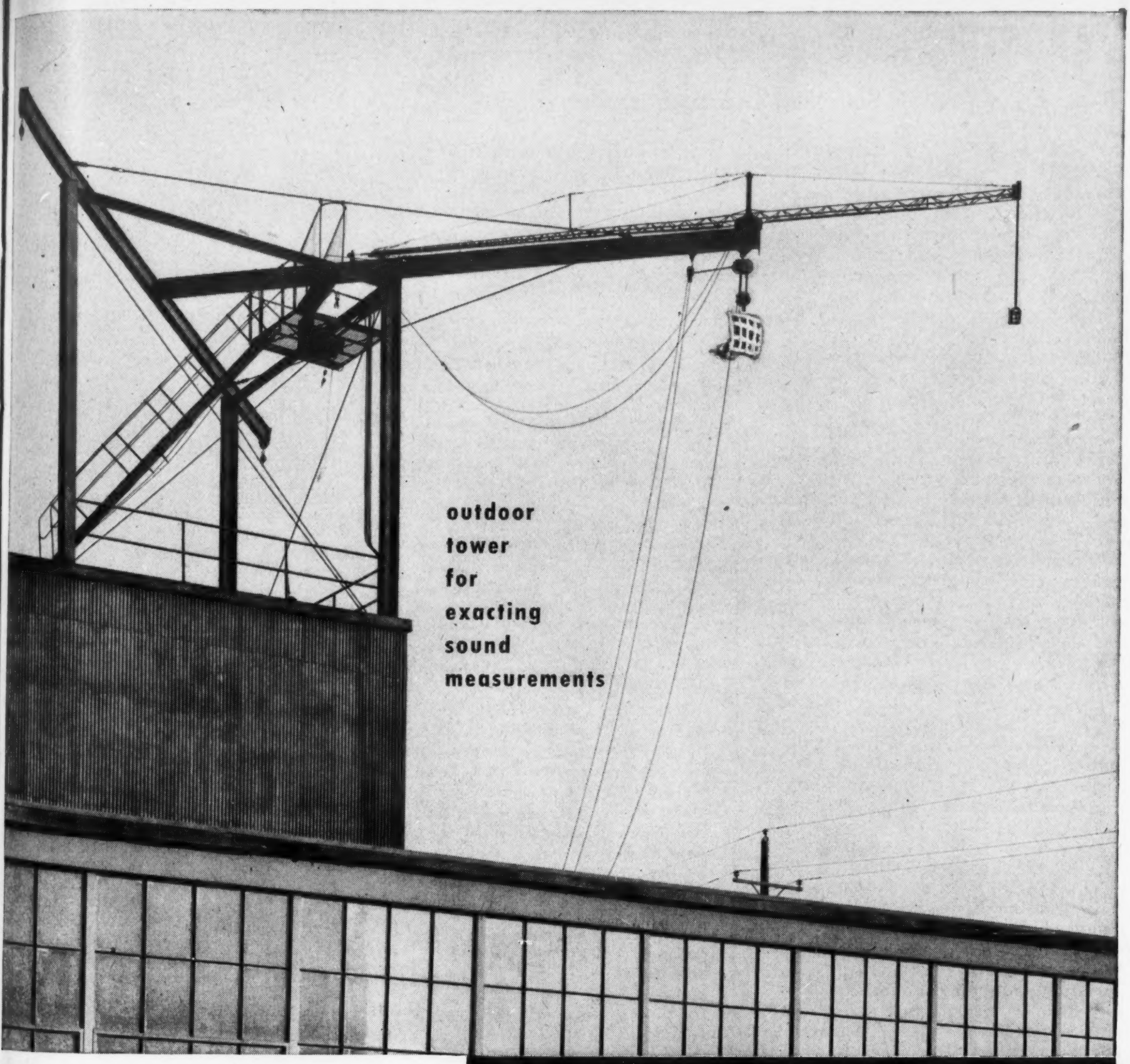
*The Army Pictorial Service is headed by a colonel, the Navy's photographic Division by a captain, and the Air Force's Air Pictorial Service by a brigadier general, a rank just recently obtained for the commanding officer of that service.

Out of military research and development have come advances, some of them amazing, in cameras and films for aerial photography and ground and sea combat uses. For the applications of these new developments each of the services has large schools and training centers, in addition to motion picture facilities for the making of training films. The utilization of photography in many and varied aspects, expanded during and after World War II, is constantly increasing in the armed services.

THIS DEPARTMENT'S PRINCIPAL SOURCE

Telecommunications Reports

Roland C. Davies, Editor
National Press Building
Washington, D. C.



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BURTON BROWNE ADVERTISING

AACS Marks Beginning of 13th Year

Rapid Growth From 300 Personnel to Over 21,000

The Airways and Air Communications Service (AACS), now a component of MATS, chalked up another year of outstanding service as it entered the 13th year of its existence on November 15. Most of the AACS units waived celebrations this year in honor of the AACSmen who are serving with the United Nations in Korea. Instead, the anniversary was marked by emphasis on the continuation of service in providing airways communications and navigational aids to insure the safety of military aircraft.

In the 13 years since its inception AACS has advanced from a handful of code stations and at total of 3 officers and 300 enlisted men to a vast network with personnel totaling over 21,000. Under the command of Brigadier General E. Blair Garland the AACS complement are providing over a thousand facilities at more than 200 strategically placed operating locations around the globe.

Today AACS is heavily committed to the U. S. Air Force world-wide movement of men and materiel, operations demanding an even larger effort than that of the Berlin airlift. Seven days a week, 24 hours a day, AACSmen guide United Nations aircraft along the aerial highways to Korea — highways which are invisible but are audible and real to the pilots.

After the invasion of the Korean Republic, AACS rushed units from the 1808th AACS Wing in Tokyo to the area of South Korea defended by the American Forces under the United Nations flag. There, these units established their air navigation and control facilities, and by mid-July had airlifted into the theater more than 300 officers and men skilled in the installation, operation, and maintenance of mobile communications equipment.

The purpose of AACS is to support the movement of Air Force aircraft between various bases or wherever the Air Force is to fly. With the first call from the control tower, the flight becomes an inter-base airways operation. The pilot on the normal flight will use the tower during the take-off; he will check his prograess with various aids, such as homing beacons, radio ranges, and direction finding stations. The pilot will communicate for various reasons with air/ground stations enroute, and he will be assisted in landing at his destination by one or all of the electronic devices. AACS has made it possible for the Air Force to fly under conditions which would ordinarily keep it on the ground.

Perched in control towers, operating ocean-spanning radio range stations, sitting hunched over television-like radar scopes of ground controlled approach devices, AACSmen are scattered about the world. They have served north of the Arctic Circle and on the Equator, in the monsoon countries and on deserts. And though they are supopsed to be non-combat troops, the AACSmen in Korea frequently exchange the sending key for machine guns and carbines to defend perimeters and to secure airfields.

The late General Henry H. Arnold was chiefly responsible for the formation of the AACS, which was originally known as the Army Airways Communications System. In later years he paid it tribute, declaring, "The AACS has taken the 'aloneness' out of flying, and with it whatever dread there might other be of air routes over lonely and dangerous areas, such as vast expanses of ocean, unconquered mountain peaks, relentless deserts. The invisible 'hands' of AACS magic reach out everywhere to guide the pilot on his course, and to his destination ,weather or terrain notwithstanding. Small wonder the flyer grows to lean on this unseen guide almost as importantly and instinctively as he does on the Great Unseen Force. That is how important you are!"

> Today the giant skyliner takes off for its flight around the world. There is no fear for its safety, no danger that it will be lost in the vast spaces of the sky. For the heavens are lined with highways placed there by an army of pioneers who stand watch over these skyroads, everywhere in the world.
>
> What sort of army is this? What do they do? How do they keep these highways open and safe for air travellers? Well, meet the AACSmen. There were over 50,000 of them on V-J day. They were all members of the Army Airways Communications System, the AACS, the aptly termed "unseen network."
>
> Others have been rewarded for flying over the Hump. But the AACSmen laid the highway in the sky over the Hump long before such flights could be made with any regularity. Many have flown across both oceans. But the AACSmen filled the skies above the seven seas with roads of safety before anything like wholesale flight was possible. There have been tales without number of airmen who flew through the blizzards of Arctic skies, or through the sandstorms of African desert, or over the jungles of the tropics. But our story has been about the men who construct and operate highways in the skies— the AACSmen.
>
> *Excerpt from "Highways in the Sky" by Louis Shores. Barnes & Noble, N. Y.*

Brig. Gen. E. Blair Garland, USAF, assumed command of the Airways and Air Communications Service on September 28, 1951. He succeeded Brig. Gen. Wallace G. Smith who had commanded the AACS for the previous three years.

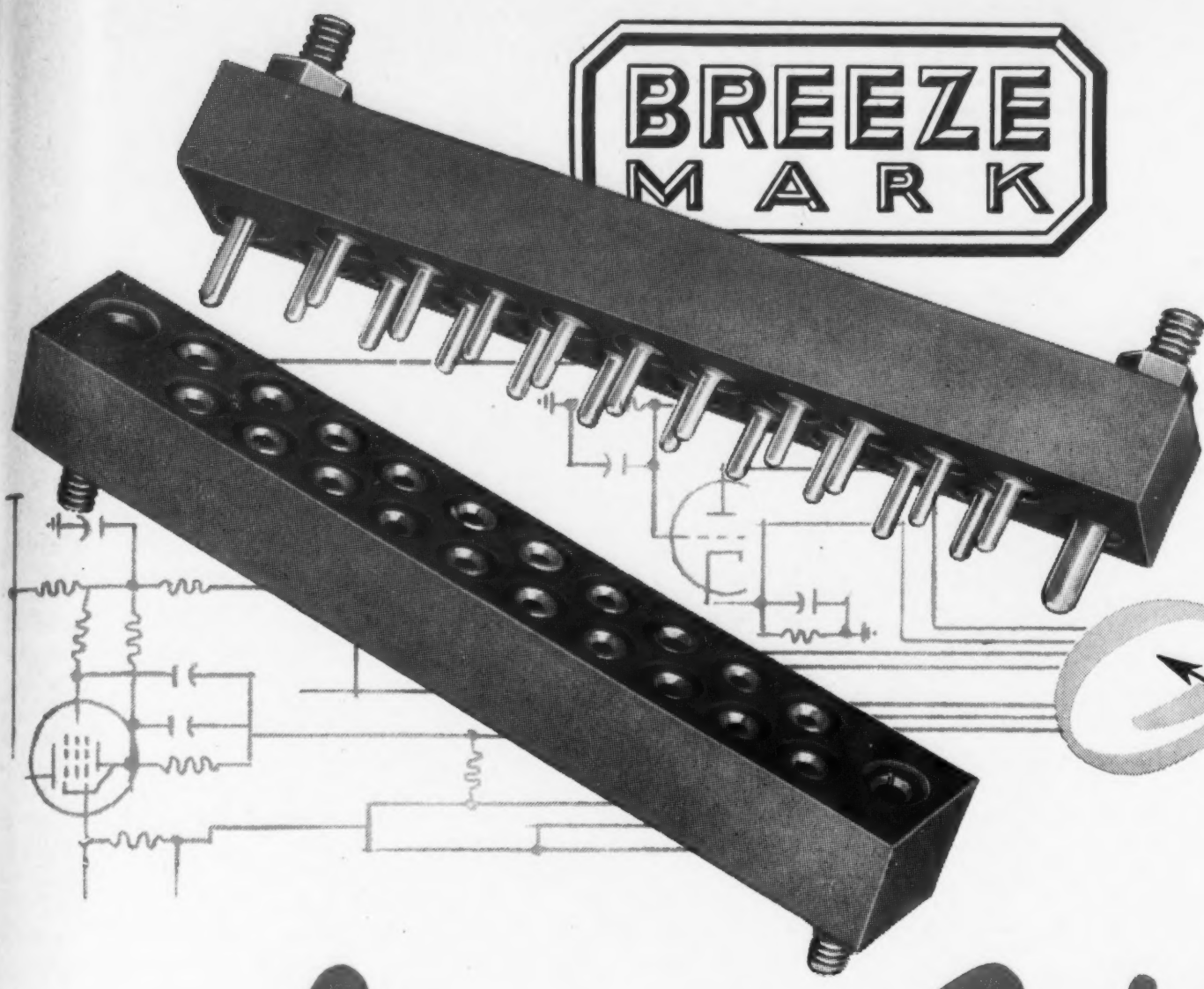
General Garland was appointed to the U. S. Military Academy, after a year at the University of Rochester, and upon graduation from West Point in June 1927 was commissioned a second lieutenant in the Signal Corps. The next year he received MS and EE dgrees from Yale University. Thereafter he held various posts in the States and served with Hawaiian Department. In 1935 he became an instructor in the department of chemistry and electricity at West Point, and held that position until transferred to he Office of the Chief Signal Officer, Washington, in September 1941.

Early in World War II he was signal officer of the Eighth Air Force in England, and later was signal officer of the Ninth Air Force Fighter Command, which became the Ninth Tactical Air Command. He served with the Ninth in France and Germany.

In 1947 Gen. Garland transferred to the Air Force and that year entered the Air War College, Maxwell AFB, Ala. He was graduated in June 1948 and became director of communications with the Tactical Air Command headquarters. In September 1949 he was assigned as commander of the 1807th AACS Wing in Wiesbaden, Germany, and held that post until this September when he was named to head AACS.

(With the Ninth Tactical Air Command General Garland had charge of the use of radar units during the invasion of France, and from this experience wrotean article for SIGNAL, "Radar In ETO Air-Ground Operations," which was published in the March-April 1949 issue.)

An Army directive was issued, November 3, 1938, which stated in effect, "On November 15, 1938, a new military organization will be activated . It will function under OCAC. Its name will be Army Airways Communications System. Its mission will be the maintenance and operation of airways communications for military aircraft . . ." The man to whom the directive was aimed, and who was charged wth the original organizing was Major Wallace G. Smith, chief of the communications section, OCAC. Closely coinciding with the AACS 13th birthday, he recently retired from active duty as a brigadier general and commanding officer of the AACS.



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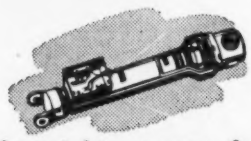

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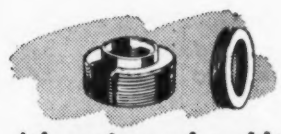

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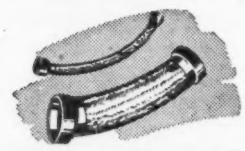

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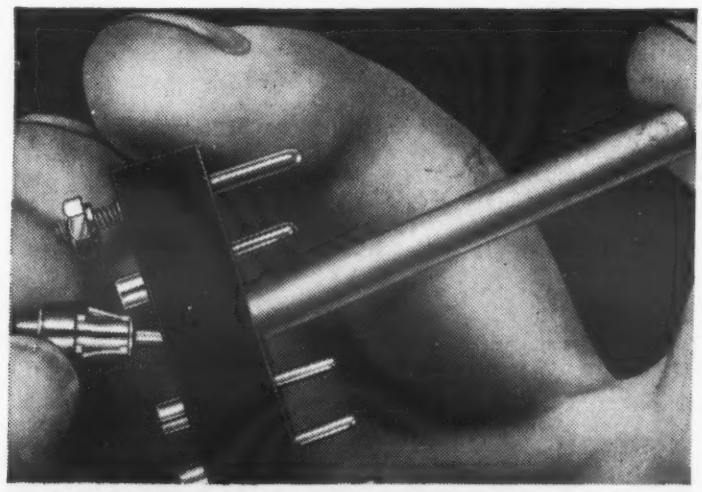

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Works Of Signal Corps Officer Featured in European Concert

Versatile Gaither Also Author Of Top Articles

A group of musical compositions by Colonel Loren E. Gaither, Signal Corps, comprised the entire Sunday Afternoon program of the Wiesbaden Symphony Orchestra, October 7, 1951, at Wiesbaden, Germany. Colonel Gaither, who is technical supervisor of the American Forces Network in Europe, has authored several widely noted articles for SIGNAL, the latest having appeared in the September-October 1951 issue.

The musical accomplishment of Col. Gaither is regarded as surprising by many, among his acquaintances, since it was not generally known that he had equipped himself with a knowledge of orchestration techniques, or even that he had any especial knowledge of music. His formal education indicates no hint of musical training. Born in Siloam Springs, Arkansas, he attended the Universities of Arkansas, Colorado, and Carnegie Tech, where he majored in electrical engineering and communications. He had had instruction in piano as a youth, however, and had early become instilled with a desire to do serious composition. The desire did not impel him to actual attempts at composition until stimulated years later by his reading of Rimsky-Korsakov's "Principles of Orchestration," a copy of which he had acquired while attending the Army Command and General Staff School at Ft. Leavenworth, Kansas.

The compositions performed by the Wiesbaden Orchestra were all oriental in theme, impressions acqiured by Col. Gaither during World War II while stationed in the CBI Theater as a signal officer with the 14th Air Force. From musical sketches he made there he developed his themes after his return to the States, and began the work of arranging the work into finished orchestrations. In the spring of 1946 he took the first two numbers to Dr. Orley See, conductor of the Oakland Symphony Orchestra for an expression of opinion. Some weeks later Dr. See requested permission to perform the numbers in public, and that summer the Oakland Symphony under Dr. See's direction, presented the two, titled "Bengal Nocturne" and "Yun-nan Sunset," at the Woodminster Bowl in Oakland. The two numbers were well received by music critics in that area, and the following winter Dr. See presented another work by Gaither, his tone poem "Amne Machin."

Colonel Loren E. Gaither

The Wiesbaden Orchestra in its all-Gaither program gave the first public presentation of five additional numbers, which included a composition which Gaither wrote in Heidelberg in the winter of 1949-50. Music critics on Wiesbaden newspapers were warmly complimentary in their comments on the compositions and the performance. One referred to "rich and fantasy-filled tonal colors"—"exotically-toned pictures"—"full-toned, fulfillment of programmatic requirements."

With Col. Gaither's latest article for SIGNAL, "Ionospheric Geography," which was published in our immediately previous issue, there appeared the photo which is repeated here. In comment on Gaither, with the photo, we made reference to his article for us, "Radio Propagation and The Use of Antennas." We stated, and it is still true, that that first article holds the record for reprint permission requests for anything we've ever published. The wide reprinting of the article, both in the U. S. and abroad, we considered as tribute to the excellence of the writing. And now, with the orchestral presentations of his compositions, there has been demonstrated the versatile Col. Gaither's ability in another field of writing.

Air Force Communications-Electronics Use Greatly Expanded

$1½ Billion Worth Last Year, Westphal Tells AFCA Group

The U.S. Air Force spent almost $1½ billion last year, and will spend considerably more this year, on communications-electronics equipment and services, Colonel G. A. Westphal, USAF, stated before a meeting of the AFCA's Washington Chapter, October 3, in an address which pointed up the magnitude of the Air Force's use of communications-electronics. Guest of honor at the AFCA meeting was Major General Raymond C. Maude, new director of Air Force communications.

Citing statistics in emphasizing the Air Force's great need and use of communications, Colonel Westphal, chief of the communications systems division of USAF's directorate of communications, at the time of the meeting, and since made director of engineering of the Airways and Air Communications Service, told the AFCA audience that the total communications traffic of the Air Force over its leased circuits and point-to-point network, worldwide, comes to more than 9 million messages per month. During the fiscal year 1951, communications companies were paid over $7 million dollars by the Air Force for leased line services, said Westphal, and this figure will more than double during the present fiscal year, making the U.S. Air Force one of the largest users of leased line services in the world.

Airborne electronics equipment, which is included in the cost of aircraft, accounted for almost half of the Air Force's $1½ billion communications-electronics outlay last year, Colonel Westphal stated. The total of the remainder, $810 million, spent for point-to-point communications, included the cost of the Air Force's ever increasing use of radar equipment.

A highlight of Westphal's address was his review of the steps taken for the establishment of the USAF command communications system, which was developde and engineered by the Western Union Telegraph Company in collaboration with the Air Force directorate of communications staff. After a traffic study was made of Air Force teletype communications, beginning in the spring of 1949, the Western Union patron 51 reperforator switching system was selected in a review of existing equipments. Use of this system reduced the previous number of relay centers from 28 to five, with two overseas outlets.

"While we do not believe that this equipment meets all of the ultimate requirements of the Air Force," Colonel Westphal stated, "we are convinced that it was the best operational equipment on the market at that time." He added that, using this equipment as a base, commercial companies are now studying the Air Force requirements to see how they can modify their present equipment or develop better equipment, and in so doing have discovered several new methods which they have adopted for their own use.

"We have found from discussions with vairous manufacturers," Westphal said, "that industry, in general, is anxious to help the military if they knew in which way they could help. In informal discussions, I have casually mentioned that we had a need for certain types of equipment which would perform certain functions. Within a surprisingly short time on several occasions the manufacturer has come along with an idea which performed far superior to the equipment we had been using and which we adopted as a commercial item. There should be a far more widespread dissemination of our peculiar requirements, and commercial equipment to perform exactly what we want might quickly be discovered. I feel that any move made to establish such a relationship would be to our mutual advantage."

Westphal Heads AACS Engineering

Succeeded By Wildes

After more than two years as chief of the communications systems division, Air Force directorate of communications, Colonel G. A. Westphal on No-

(*Continued on page 72, col. 2*)

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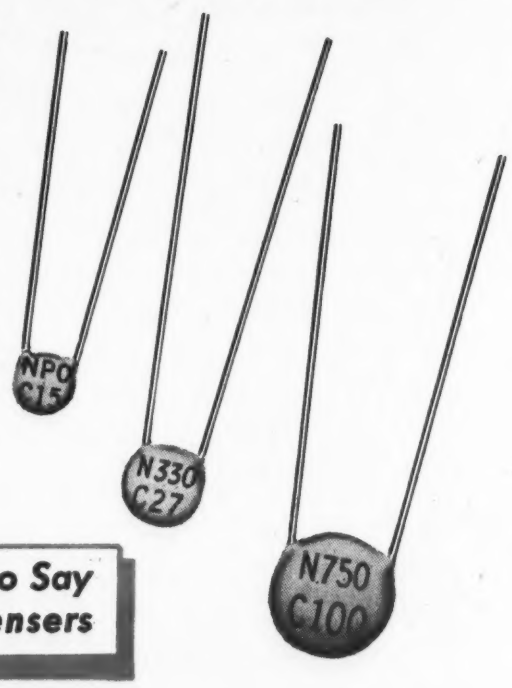

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Goddard Receives Photo Society Award

PSA Meet Sees Photography Advances

In a spectacular technical show the latest photographic inventions and developments from industrial and Air Force research were brought before the Photographic Society of America's 1951 convention in Detroit, October 10-13, while on the opening day of the meet the Society presented its 1951 Progress Medal to Colonel George W. Goddard, USAF, in recognition of his pioneering in modern aerial photography.

Outstanding among the displays shown to the visiting members were Eastman Kodak's "hot photography" and double-image Colorama, a new Xerography process by The Haloid Company, speedy new x-ray processing by the Polaroid Corporation, and the unique Baldwin photoelectric organ.

During the technical session, on the final day of the four-day-meeting, new methods in photography discovered or evolved during the past year were described. How ordinary formaldehyde has been used successfully in processing photographs was told by George Ehrenfriend of Polaroid who characterized the unusual developing agent and showed examples of photographs produced by the process. A new method for accurately predetermining exposures for photo negatives was outlined by Thomas Knowles of General Electric; "techniques for evaluating color reproduction with color negative monopacks" was the subject of an address by John B. Taylor of Ansco; new dry-battery-powered electronic photoflash equipment was described by Paul Marsal and Norman Potter of National Carbon; Dr. F. G. Back, president of the Zoomar Corp., delivered a paper on "modern developments in mirror lenses; and various methods of flash synchronization for still cameras were described by Stanley H. Duffield of Eastman Kodak.

Max Beard, a high speed photography specialist with the Naval Ordnance Laboratory, White Oaks, Maryland, speaking at the industrial symposium on the opening day of the PSA convention, stated that cameras operating on a grid principle sometime employed in imparting apparent motion in children's toys and advertising signs are now giving taking speeds of the order of one billion pictures per second. Such speeds are seldom required in industry, Beard pointed out, where most studies in motion can be met by movie cameras in which instead of periodic stopping of the film to record each frame the film moves continuously and a roatating prism sweeps the image in synchronism. Cameras of this type, which make from 500 to 12,000 frames a second, are almost as much in demand by the photographers at the Naval Lab as conventional cameras, said Beard. The big problem, as he saw it, was to choose the right speed for the subject, but he thought it was a problem that could be solved by any photographer who knows what he is after.

Also during the first day industrial symposium, photography's large-scale, highly effective use in helping create fleets of airplanes out of drawings was detailed by M. G. Holland of North American Aviation's Los Angeles parent plant whence stem the original full-scale drawings which are photographically duplicated onto metal for distribution to outlying factories. Holland described how the complicated shapes that emerge from the aerodynamicists' abstruse colculations for the newest aircraft are now being drawn on a new type of glass-fiber cloth. The material can be made in thicknesses of a few thousands of an inch, on which drawings are contract-printed photographically to metal bearing light-sensitive emulsion.

In contrast to the kind of photography which creates full-sized airplane shapes out of drawings, Fred Basom of University Microfilms described advances in the evergrowing practice of microfilming drawings and other papers for the benefits of extreme reduction in storage space. The wider 70mm film is rapidly growing in popularity for microfilming use, said Basom, and processing speed, which is important to the production economy in making large-volume microfilming practical, has been substantially increased by the use

(*Continued on page* 68, *col.* 2)

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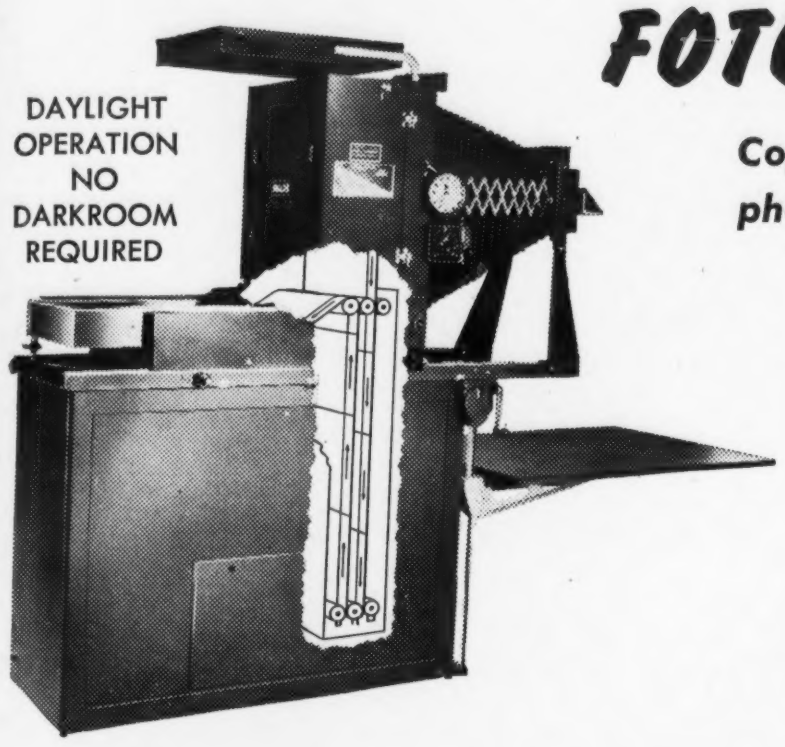

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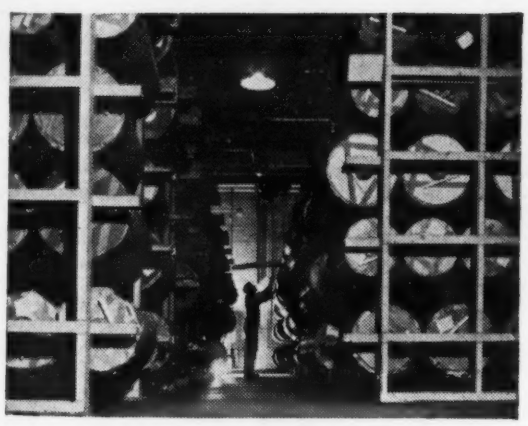

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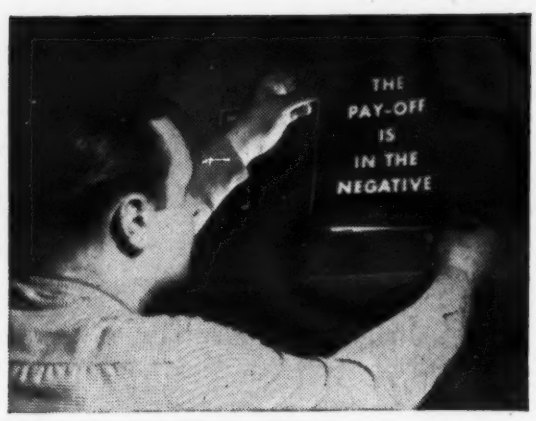

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New Major Center

(*Continued from page* 54)

don, Georgia, to open the Signal Corps Training Center there—an installation which has since then undergone vast growth.

General Reichelderfer served in the Pacific area during World War II as signal officer of the Sixth Army, and held that assignment throughout Sixth Army operations from New Guinea to Japan. Upon his return to the United States he served briefly in the Office of the Chief Signal Officer, after which he went to Fort Monroe as signal officer of Army Ground Forces (now Army Field Forces). In October 1948 he was assigned to open the new Camp Gordon center, and in June 1949 he became commanding general of the Signal Corps Engineering Laboratories at Fort Monmouth. He has been in command of Fort Monmouth itself since April of this year.

The establishment of General Reichelderfer's new command, Camp San Luis Obispo, as a Signal Corps installation, where there will be also established the Southwestern Signal Corps Replacement Center and the Southwestern Signal School, resulted from the need for a signal training center on the West Coast to eliminate the expense of transporting trainees from that area to the East Coast for training at Fort Monmouth or Camp Gordon.

In addition to the military personnel to be assigned to the new California installation, the Signal Corps announces, approximately 450 civilian employees will be needed. Among civilian workers critically needed are instructors in military electronics and communications subjects. Stenographers, typists, clerks, utility repairmen, and laborers will also be required, the Signal Corps said. Applicants for any civilian position should write to the Commanding Officer, Camp San Luis Obispo, California, inclosing a Civil Service Form 57.

"Hamfest" At Sioux Falls

Amateur Fowley Receives AFCA Award

Approximately 300 radio amateurs gathered at a "hamfest" at Sioux Falls, S. Dak., October 6-7, saw the presentation of the AFCA's honor award made to one of their group, James W. Fowley, a local resident. Lt. William Spanke, Signal Corps, representing Colonel Glenn H. Palmer, signal officer, and Colonel Edwin O. Earl, acting signal officer, Fifth Army, made the presentation, and following the award addressed the amateurs.

The assembled "hams" also heard an address by the director of the American Radio Relay League's Dakota division, Judge Goodwin L. Dosland, and an illustrated lecture on the latest developments of the Bell Laboratories, including the transistor and the new tone toll dialing system, delivered by Northwestern Bell Telephone engineer Lloyd Horn. Following the general meeting Military Amateur Radio System members present were led in a discussion by Joel Hofslund, director of MARS for the Fifth Army.

The recipient of the AFCA honor award, Mr. Fowley, has been identified with Naval Reserve radio activities for nearly twenty years, and is at present in charge of the electronics department. Surface Division 9-208 of the Naval Reserve unit at Sioux Falls. He obtained his amateur radio license in 1931 and in 1932 organized the first Naval Reserve unit in Sioux Falls. He was acting commander of the unitl until July 1942 when the entire unit was called to active duty.

In the early part of World War II Fowley helped organize and later was

James W. Fowley, member of Sioux Falls Amateur Radio Club receives AFCA Honor Award from Lt. William Spanke, assistant communications officer, Fifth Army. Presentation was made during radio amateurs' convention at Sioux Falls, S. Dak.

supervisor of convoy procedure at the Noroton Heights Naval Radio School. Many innovations in teaching radio and radio procedure were devised by him and became accepted parts of the school course. Later during the war he was sent with a Naval radio group to Clipperton Island in the Pacific to set up an aerological station.

Following the war Fowley returned to Sioux Falls and became a sales engineer for the Fairchild Instrument Corp. In resuming his Naval Reserve activities he made the complete installation of the radio transmitting and receiving equipment, as well as two complete CIC installations at the new local armory. The commandant of the 9th Naval District then had Mr. Fowley make similar installations at other Naval Reserve armories.

Signal Corps Personnel Notes

Colonel Harry E. Storms, retired after 34 years of distinguished service in the Army, the last 25 of which were in the Signal Corps. His last overseas duty was as signal officer, Kobe Base, Japan, and signal officer of IX Corps, Japan. He returned to the U.S. in October 1948 and was assigned commanding officer of the Baltimore Signal Depot, the post he held upon retirement.

Colonel Alfred E. Anderson, assumed command of the Baltimore Signal Depot upon the retirement of Col. Storms. Col. Anderson had been deputy commanding officer at Baltimore since his return from Panama where he was signal officer, USARCARIB.

Colonel Cary J. King, Jr., chief of engineering and technical division, OCSigO, has been designated as Department of the Army member on the committee on electronics, research and developmetn board.

Colonel William Preston Corderman, assigned commanding officer of the Philadelphia Signal Corps Procurement Agency.

Colonel W. D. Dillinger, former commanding officer at Philadelphia, assigned to the Far East Command.

Colonel Marcellus R. Kunitz, designated chief of methods and procedures branch, Army Communications Service Division, OCSigO.

Colonel Reginald P. Lyman, assigned commandant for the Signal School at Fort Monmouth, N. J. He had been signal officer for the Third Army.

Colonel Harrod G. Miller, who preceded Col. Lyman, and had held that post for three years, has been assigned a member of the weapons systems evaluation group in the Office of the Secretary of Defense, Washington.

Colonel Harry L. Vitzthum, formerly assistant chief, procurement and distribution division, OCSigO, has been designated chief of operations review division.

Colonel Edwin R. Petzing, appointed commanding officer of the Signal Corps Engineering Laboratories. Col. Petzing had been chief of engineering and technical division, for almost four years, at OCSigO.

Colonel Benjamin Stern, formerly director of Evans Signal Laboratory, assigned deputy directory of the Signal Corps Engineering Laboratories, replacing Colonel W. A. Beasley. Col. Beasley was recently awarded the Certificate of Achievement, the presentation being made by Brig. Gen. Harry Reichelderfer, commanding general of Ft. Monmouth, former SCEL director, and now taking over command of the new San Luis Obispo installation.

Lt. Colonel Carolus A. Brown, designated assistant chief, engineering and technical division, OCSigO. Col. Brown authored the article "Signal Corps Research and Development" which appeared in the March-April 1950 issue of SIGNAL.

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Gen. Wade, British Attache, Made Honorary AFCA Member

Addresses Washington Meeting

Major General Douglas Ashton Lofft Wade, C.B., O.B.E., M.C., telecommunications attache of the British Embassy in Washington, was presented with an honorary membership in the Armed Forces Communications Association at a November 7 luncheon meeting of the Association's Washington Chapter. The presentation was made by Col. Percy Black (USA, ret.), AFCA Washington Chapter president, and assistant vice president of the Automatic Electric Co. in charge of Washington affairs.

Following the presentation at the meeting in the National Press Club, Gen. Wade addressed the AFCA members, stating that he felt the presentation to him of the certificate of membership symbolized the unity of purpose and joint respect of the communications branches of the American and British military forces. He emphasized that communicators, more than any other group, have contributed more to the forging of relationships between nations through the transmission of written and spoken words.

Gen. Wade noted that this year was a most important anniversary in communications, marking the laying of the first cable between Dover and Calais by the British Royal Navy 163 years ago and the 50th anniversary of Marconi's first wireless transmissions across the Atlantic. He related that the British Army first used mobile radio in 1900 in South Africa, and that the Battle of Britain against the Nazi bombers gave the biggest impetus to the development of radar.

Gen. Wade's career has been identified with communications since World War I. After service in France, Russia, and Italy during that war, he went to Cambridge where he studied electrical engineering and radio. From 1925-28 he was instructor in the Army School of Signals, 1928-33 had duty at the War Office, and 1933-34 at Staff College Camberley. From 1935 he served in India and at the outbreak of World War II was senior signal staff officer for the GHQ in France until Dunkirk. After Dunkirk he held the same position in the Home Forces. From 1941 he held appointments in staff and command in India and Malaya, was deputy adjutant general in India, in command at Madras, and in 1948 was in command at Malaya. 1948-49 he was engaged in legal duties in the War Office, and in 1950 he was retired.

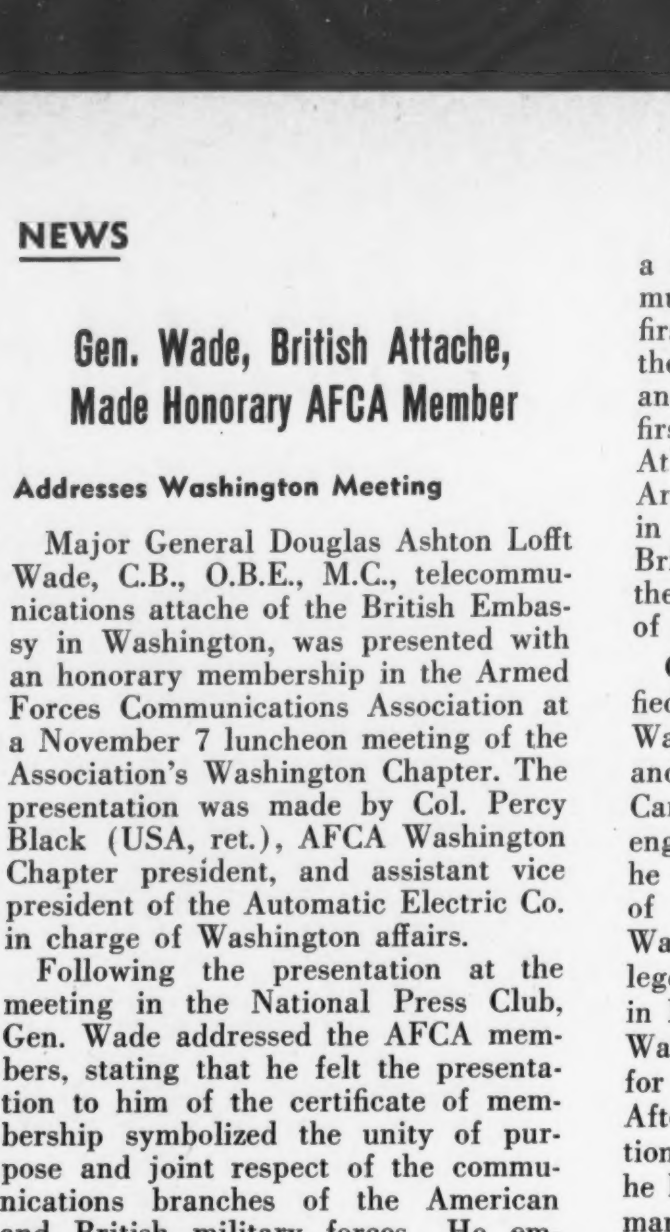
Rear-Admiral Stanley F. Patten, USN (ret.), has been elected vice-president of Alln B. Du Mont Laboratories, Inc., by the board of directors, it was announced recently by Dr. Allen B. Du Mont, president.

Admiral Patten, who has been with the Du Mont organization as assistant to the president since July, 1947, and is a member of the AFCA, served in the Navy, 1917-1947, as a line officer, specializing in electronics and communications.

During World War II, from 1940-1943 he served as assistant head of the radio division, Bureau of Ships.

He participated in the Kwajalein, Saipan and Leyte Gulf campaigns. He retired from active duty with the Navy in January, 1947.

His last assignment before retirement was that of district communications officer of the 13th Naval District at Seattle, Washington.



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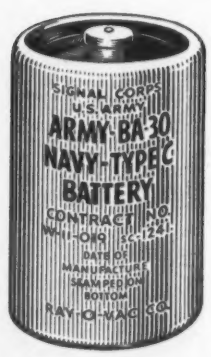

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Navy to Study Eclipse in Sudan

The Navy is planning an expedition to Khartoum, in the Anglo-Egyptian Sudan, in early 1952, to make radio observations of a solar eclipse. On February 25, 1952, the sun will be totally eclipsed by the moon for about three minutes, and Khartoum will be directly in the path of the eclipse.

Although this will be the third eclipse expedition for the Naval Research Laboratory of the Office of Naval Research, it will represent the first integrated program for making comparative measurements. Both optical and radio measurements will be made under the overall direction of Dr. John P. Hogan of the NRL.

Radio "telescopes" or radiometers, which have been designed and constructed by NRL, will be used for studying the radio emissions from the sun's atmosphere, using radio frequencies of 35,000 megacycles and 3,000 megacycles, which will correspond to radio wave lengths of 8.5 millimeters and 10 centimeters. This will be the first time that measurements have been made at the shorter wave length.

The optical observations to be made by NRL scientists include a series of photographs of the total eclipse known as coronagraphs, as well as high-speed motion pictures of the full event.

Navy scientists believe that temperature measurements by radio means are more accurate than those which have been made by optical means, since the majority of the energy emitted by the sun's chromosphere is in the radio frequency region of the spectrum, rather than in the visible light region.

The eclipse expedition is part of the Laboratory's overall program of radio astronomy which was begun in 1946. Radio astronomy is of scientific interest since it extends the range of astronomical observations through the use of radio frequencies. The primary objective of this program is to extend man's knowledge of the universe through study of such problems as the composition of the sun's atmosphere, the nature of radio emissions from the sun, moon, and the stars, and the times and nature of solar outbursts or "flares." Such information is expected to be useful in improving long-range radio communication and weather forecasting.

Other NRL Notes

A model technique for the measurement of radar characteristics of targets has been developed by the Naval Research Laboratory, ONR. A target model introduced into the field of an electro-magnetic horn antenna causes the unbalance of a previously balanced hybrid junction placed in the antenna field, the unbalanced signal is amplified by a receiver and applied to a recorder which gives a polar plot of

* MAGNECORDER *Sound Performance*

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Magnecord Tape Recorders are on duty in Korea. Intelligence officers using Magnecorders record first-hand reports of jet pilots just back from front-line sorties. Used extensively by the Air Force, Magnecorders undergo extremes in field conditions and still record with dependable high fidelity.

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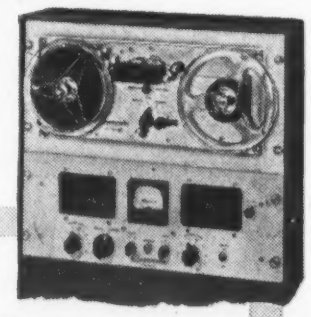
MORE FEATURES
PT7 accommodates 10½" reels and offers 3 heads, positive timing and pushbutton control. PT7 shown in console is available for portable or rack mount.

GREATER FLEXIBILITY
In rack or console, or in its really portable cases, the Magnecorder will suit every purpose. PT6 is available with 3 speeds (3¾", 7½", 15") if preferred.

HIGHER FIDELITY
Lifelike tone quality, low distortion, meet N.A.B. standards — and at a moderate price. PT63 shown in rack mount offers 3 heads to erase, record and play back to monitor from the tape while recording.



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the radar area of the model.

Soap suds, barber shop type, has been found to be the only satisfactory polish for soft crystals of the kind which transmit invisible light and heat rays. Scientists at NRL, in arriving at this conclusion, also report that the soap dispenser seems indispensable—suds from a mug may be fine for another mug, but it's no soap for polishing lenses.

Fully Automatic Teletypewriter Switching System for the Army

Shown at Chicago AFCA Meeting

Plans to provide the Army with a fully automatic teletypewriter switching system were recently revealed at a regular meeting of the Chicago Chapter of the AFCA held at the Museum of Science and Industry in Chicago.

The system is being developed and manufactured by the Automatic Electric Company, Chicago, under a specification prepared and issued by the Signal Corps Engineering Laboratories. Leith Johnston and Richard C. Stiles, project engineers of Automatic Electric, described briefly for the AFCA members the background of teletypewriter service in military networks and told how the new switching system will help to speed teletypewriter communications.

The new equipment has been designed to replace the "torn tape" systems which are currently being used in military networks. Because the new system has been designed to meet the requirements of existing operational procedures, it can be installed at any point without installation of similar equipment anywhere else in the network.

When installed at a switching center, the new equipment will receive messages over full duplex lines and will automatically check message serial numbers as a means of preventing loss of messages. Following a successful serial number check a special director is called into action which "reads" the address portion of a message and determines how the message is to be routed. Messages are routed by the director and its associated switching equipment to storage devices which are called cross office units. Each message waits in the cross office unit until the desired out-going line becomes available, at which time it is automatically transmitted to the outgoing line.

Numerous special features of the system are of interest. One is the provision that messages of high degree of precedence can interrupt and terminate transmission of a message of lower degree of precedence. Another outstanding feature of the system is its ability to process multiple address messages according to existing procedures. It is expected that such automatic processing of multiple address messages will greatly speed their delivery.

Naval communicators receive commendation awards. In ceremonies at the Pentagon recently, Captain Wilfred B. Goulett, Director, Naval Communications, (at left in photos) presented Letters of Commendation to Lt. Commander William K. Reordan (left photo) and Lt. Commander Walter M. Ousey, both of whom are now on duty in the Naval Communications Division, Office of the Chief of Naval Operations, Washington. The Letter of Commendation, with C ommendation Metal Pendant, Ribbon and Combat Distinguishing Device was awarded to Comdr. Reordan for meritorious service while serving on board the destroyer USS Aylwin, incident to the attack on Pearl Harbor by the Japanese on December 7, 1941. The Letter of Commendation, with Commendation Ribbon and Combat Distinguishing Device was awarded Comdr. Ousey for his meritorious achievement as executive officer and navigator of the USS Ozbourn (DD846) while engaged in combat operations in support of UN forces in Korea.

Army to Expand Microwave Use

Steps to improve Army communications systems overseas and to provide reserve communication facilities in the U.S. have been taken with the award of a contract to the General Electric Co. for extensive additional microwave equipment for military use.

Each of the microwave systems to be installed by the Signal Corps, will provide the equivalent of 24 private telephone lines, enabling Army personnel to contact instantly any of the key military activities which will be connected in the system.

Higher Rocket Altitudes Made Possible Via SigCorps Devices

The reduced size and weight of a new miniaturized Signal Corps radar beacon and other electronic equipments to be carried aloft by Aerobee rockets will not only cut the payload, enabling these missles to zoom higher by an estimated 35,000 feet, to a new 300,000-foot mark, but will also improve the tracking and safety devices of the flight.

The beacon, which relays signals from and to radar sets on the ground to indicate the rocket's position, has been reduced by two-thirds in weight and by more than six times in volume. New subminiature tubes, condensers, resistors, and other electronic devices, developed at the Signal Corps Research Laboratories at Fort Monomuth, N. J., make this advance possible.

Tracking the rocket's instruments on the downward journey to earth for recovery and study will also be improved by a new type antenna to be flush-mounted in the rocket's skin. The new design insures a continuous flow of signals to the tracking radar set on ground regardless of the amount of tumbling in space.

Another miniaturized rocket device is a fuel cut-off receiver which automatically goes into action if the rocket veers from its pre-determined course. Sensitivity of this safety device has been increased despite reduction in weight by two-thirds and in size by one-half. The new receiver has been designed to withstand shock equivalent to many times the force of gravity. Improved circuitry has decreased by one-third the number of tubes needed.

780,000 Feet of Korea Film

Up to September 30 the Signal Corps Photographic Center at Long Island City, New York, had processed 780,319 feet of motion picture film shot by Signal Corps cameramen in Korea. This footage is used in newsreels, training films, film reports, historical films, and information films.

During World War II about 100,000,000 feet of movie film was shot by Signal Corps photographers in every theater.

New Signal Corps Dry Battery

The Signal Corps, as part of a continuing study of sources of supply and industrial mobilization planning, has developed a new dry battery which substitutes plentiful low-grade domestic manganese dioxide for the high-grade product found in sufficient quantity only on the African Gold Coast. The new batteries, it is said, will last twice as long as those now in use.

While manufacture of the new battery is expected to be slightly more costly, substantial economies, it is forecast, will eventually result from its doubled life and from the reduction in storage and shipping costs.

The development resulted from research contracts let by the Signal Corps in 1946 and continuing studies made at the Signal Corps Engineering Laboratories. Once the principle was perfected and tested the practicability of manufacture on a production line basis was established and a contract was awarded. This pilot plant test has proved satisfactory and action has now been taken to expand output.

FCC Proposals Affecting "Hams"

Two rule-making proceedings affecting the amateur radio service, one to take up possible subdivision of the 7000-7300 kilocycle band for frequency shift keying or amplitude modulated telephony, and the other calling for authorization of narrow band frequency or phase modulation radiotelephony, and in the 3800-4000 and 14-200-14,300 kc areas, were adopted by the FCC Oct. 31. In both instances, comments are requested from interested parties by Wednesday, January 2.

Discussing the 7000-7300 kc band, the Commission did not propose specific rules, but instead called for comment on a series of seven issues. Proposals before the Commission include the American Radio Relay League's proposal that 7250-7300 kc be opened for frequency shift keying for radioprinter operation, the National Amateur Radio Council's request for a 100 kc segment for AM radiotelephony, and the plea of an individual amateur that frequency shift keying be permitted on all amateur frequencies below 27 megacycles.

Issues to be covered in the comments are as follows: which band below 27 mc would be most appropriate for frequency shift keying; would normal "ham" activity be hampered if AM radio-telephoney were permitted; what portion of the band, if any, should be approved; would simultaneous authorization of frequency shift keying and AM radiotelephony in the same segment affect either adversely; and should all or part of the authorization be limited to holders of at least advanced class licenses, or general and conditional class licenses.

The other new rules would authorize use of narrow band frequency or phase modulation in 3800-4000 and 14,200-14,300 kc in lieu of presently authorized 3800-3850 and 14,200-14,250 kc. The FCC said it does not propose to permit PM telephony in the 1800-2000 kc amateur band, because of the priority of the loran system or radio navigation and the existing limitations on amateur operations in that band.

On both rule-making proceedings, the Commission will hold oral argument if the comments warrant.

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NPA Aide Stresses Key Role Of Photo Industry In Defense

Forecasts Short Supply For Amateurs

Importance of the photographic industry in the defense program assures larger allocations of materials than to manufacturers of strictly civilian goods, members of the AFCA's Rochester Chapter were told at their first fall luncheon meeting. Speaker was Nathan D. Golden, chief of NPA's motion picture and photographic products division.

Golden warned that industries have now entered the period of the "big squeeze" in availability of materials. Amateur photo supplies will feel the pinch in 1952, he said, but larger allocations will be given for industrial and professional photographic products. The Controlled Materials Plan, he added, aims to assure 100 per cent of materials needed for defense production and a fair division of the rest of the materials available.

"We want to keep the photographic industry intact," the NPA photo division chief stated, "because we recognize its importance in wartime. Wars are fought today with cameras as well as guns, for without reconnaissance pictures bombs and projectiles could not be effectively directed."

Following Mr. Golden's address at the meeting, which was presided over by the Rochester Chapter president, Joseph C. Wilson, president of the Haloid Company, photographic industry representatives asked specific questions on operation of the materials allocations plan.

Photography Developments Shown at PSA Convention

Goddard Honored

(*Continued from page* 60)

of warmer developing solutions. Prehardening of the emulsion is necessary under these conditions, he pointed out, which has limitations since beyond a certain point the solutions begin taking longer to penetrate the emulsions. Biggest limitation on production rates of microfilms, Basom reported, is the space required for drying the 70 mm film. With 16 mm and 35mm film this problem is less costly to solve. The 35 mm width, Basom felt, offered the happy medium between cost and finess of detail in storing books, music, and other records that must be conveyed from the past to the future.

In addition to Colonel Goddard, other workers in photography honored at the PSA Detroit convention were Edward Weston, famous photographic artist, who was elected an honorary fellow of the Society, and Edward B. Noel, General Electric development engineer, who received the PSA's annual journal award. Glenn E. Matthews and Dr. E. P. Wightman, both technical editors with Eastman Kodak, were elected honorary members. The society's honors committee named 26 new fellows of PSA and 72 associates. This list included residents of Cuba, India, Australia, Sweden, Canada, England, France, and Hong Kong.

Colonel Goddard, chief of the photographic laboratory of the engineering division at Wright-Patterson AFB, Dayton, Ohio, and a familiar figure to many AFCA members because of his talks and demonstrations before the Associations chapters, was presented the PSA's 1951 Progress Medal for his unique and outstanding contributions to the progress of aerial photography. A major portion of his military career has been devoted to experimental work in that field. He pioneered the development of rapid processing of photo film and prints in airplanes during flight, wire transmission of military air photographs, and simplified developing and printing equipment. He is credited with the invention of special shutter and flash synchronization equipment for aerial cameras used in making the world's first night aerial photographs. This equipment is now standard in the Air Force.

In 1917 Goddard enlisted as a private in the aviation section of the Army Signal Corps and was graduated the following year from the first officers' school in aerial photography at Cornell University. He received his commission as a lieutenant in the Air Corps in 1918. Following pilot training he was assigned to McCook Field, Nebraska, as officer in charge of aerial photographic research. During this assignment he began development of infrared long-range photography, special aerial cameras, photographic airplanes, and portable field laboratory equipment.

In 1920 he was transferred to Washington, D. C., in charge of aerial photography in the Office of the Chief of Air Corps. He later returned to McCook Field where he spent several years directing research on aerial photography. During World War II he served in the European Theater. He has been in his present post at Wright-Patterson AFB since 1945.

Exhibits At PSA Convention

"Hot photography," speedy x-ray processing, double-image Colorama, a new Xerography process, and a unique photoelectric organ were among the new wonders of the photographic world displayed to members of the Photographic Society of America during the Society's four-day national annual meeting, October 10-13 at Detroit, Michigan.

In a demonstration of high-speed processing Eastman Kodak technicians turned movie cameras on members of the audience and projected the film for the audience less than ten minutes later. The fast processing was accomplished through the use of photo solutions heated to about 125 degrees F. In a machine carrying the exposed film over rollers and in and out of miniature tanks the film is developed, fixed, washed, dried, and ready for projection in a matter of minutes. The tanks receive a continuous flow of fresh, hot solution. The film unwinds from special, quick-drying drums, each frame of 16mm film actually moving through the machine in about 60 seconds. The high-speed processing was developed by Kodak research laboratories for the Army during World War II.

In another display of extraordinary speed in processing, a new type of x-ray film which promises to revolutionize battlefield diagnosis and treatment of wounds was demonstrated before the PSA members by Polaroid Corporation research engineers. The new process requires no darkroom or specially trained personnel for developing the film. Yet it enables doctors to examine x-ray pictures of patients 60 seconds after they are taken.

In the demonstration before the PSA audience a Polaroid research engineer took a film packet which had been exposed in a standard x-ray machine in the usual way and ran it through a pair of steel rolls in a box no larger than an overnight case. A minute later he removed the completed x-ray picture, showing the bones of the human hand in clear detail. The whole operation was simpler than loading the average box camera.

The new x-ray technique is based on the Polaroid Land "picture-in-a-minute" process invented by Dr. E. H. Land, president of Polaroid.

The film used comes in sheets about 10 inches square and is developed without liquids. All that is necessary is to run the film packet through the steel rolls. The x-ray picture, dry and ready for use, is finished in 60 seconds.

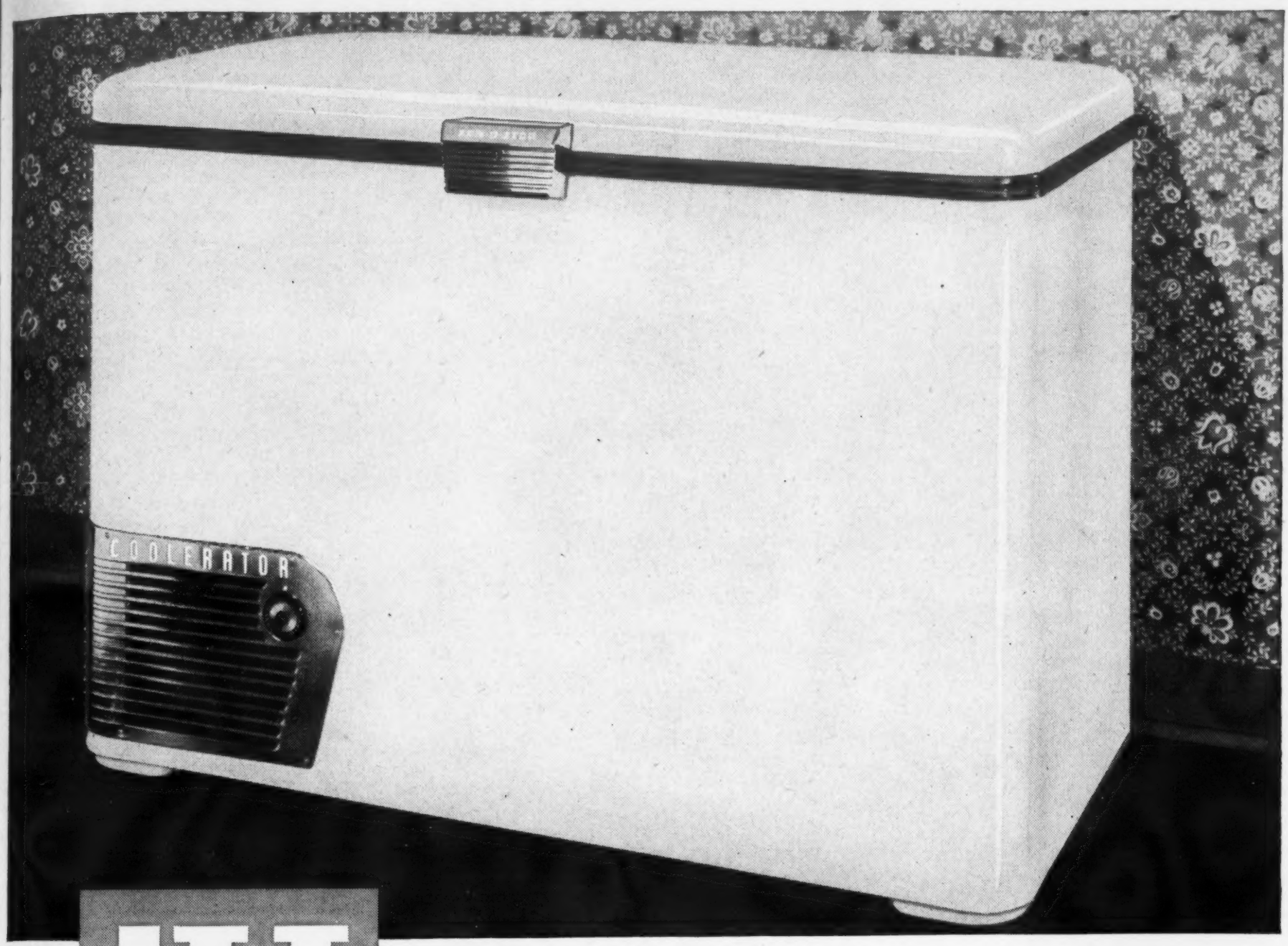
The new film produces a positive print, the same as a conventional black-and-white photographic print, instead of the transparent negative picture produced by ordinary x-ray film.

Because of the simplicity of the process, doctors will be able to locate shell fragments and do other types of diagnoses close behind combat lines. The speedy x-ray information will enable the medical man to prescribe proper treatment immediately in a much higher number of cases under the stress of combat conditions. In addition to the saving in time, the new film needs no special illuminator like those used with conventional transparent film.

Rear Admiral H. L. Pugh, surgeon general of the Navy, revealed last March that the new film had been tested by the Navy Medical Research Laboratory at Camp Le Jeune, North Carolina. Initial production of the new film, film holder, and processing box are to be released to the armed forces early in 1952, according to Polaroid.

For the PSA convention visitors The

(*Continued on page* 70, *col.* 2)



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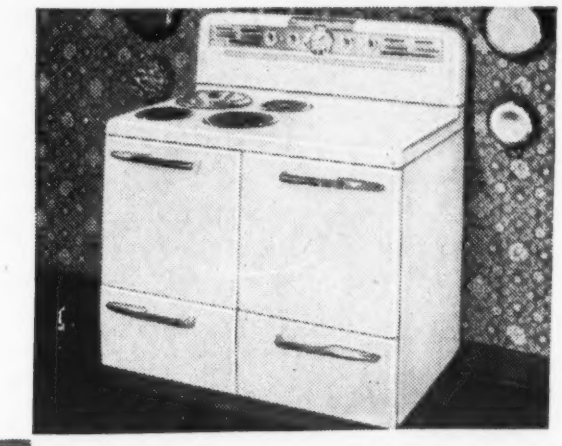

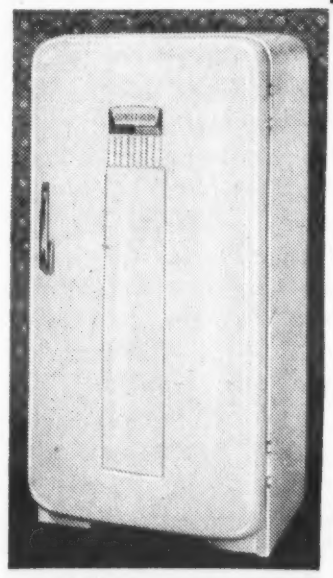

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Gen. Back Speaks at Sioux City

The major functions and responsibilities of the Army Signal Corps, together with its role in the Korean fighting, were described by Maj. Gen. George I. Back, Chief Signal Officer, in an address Thursday, Nov. 8, before the Kiwanis Club of Sioux City, Iowa, the General's birthplace and home during his youth. General Back and Mrs. Back had also stopped at Sioux City while en route from Tokyo to Washington when the General took over the post of Chief Signal Officer.

Sinclair Elected IRE President

Mr. Donald B. Sinclair, chief engineer of the General Radio Co. of Cambridge, Mass., and guided missile expert, has been elected president of the Institute of Radio Engineers for next year through mail balloting of the membership. Harold L. Kirke, assistant chief engineer of the British Broadcasting Corp., was named vice president.

The IRE also announced that the 1952 Morris Liebmann Memorial Prize has been awarded to Dr. William Shockley of the Bell Telephone Laboratories, and that the 1952 Zworykin Television Prize has been awarded to B. D. Loughlin of the Hazeltine Electronics Corp., both prizes to be presented at the Institute's annual dinner in New York, March 15.

New directors of the Institute elected include: President Glenn L. Browning of Browning Laboratories of Winchester, Mass., and Irving G. Wolff of the David Sarnoff Research Center, the RCA Laboratories.

Coast Guard Academy Entrance Exams in February

Applications Invited

Competitive examinations for appointment to the U. S. Coast Guard Academy at New London, Connecticut, will be held in major cities throughout the U. S. and its territories on February 18 and 19, 1952. Applications are desired from high school seniors who can qualify physically and who will have graduated by June 30, 1952, with a minimum of 15 credits. Applications should be postmarked not later than January 1, 1952.

Coast Guard cadets pursue a 4-year course of instruction leading to a Bachelor of Science degree in Engineering with eligibility for commissions as ensigns in the Coast Guard. They receive, in addition to the required technical course, practical and professional training vital in the education of Coast Guard officers. This training includes summer practice cruises to foreign ports during which cadets put into actual use their theoretical and practical studies. Upon graduation and when commissioned, officers are assigned to active duty in one of the many fields of service.

Electronics have an important application in the Coast Guard, since it has among its assignments aids to navigation, weather patrol, search and rescue, and lifesaving.

For detailed information write the Commandant, U. S. Coast Guard (PTP), Washington 25, D. C.

To electronics students it may be pointed out that electronics has important applications in the Coast Guard whose assignments include aids to navigation, weather patrol, search and rescue, and lifesaving.

For detailed information write the Commandant, U. S. Coast Guard (PTP), Washington 25, D. C.

Exhibits

(*Continued from page* 68)

Haloid Company gave its first public showing of a new Xerographic reversal process which permits positive reproductions from either negative or positive microfilm originals. The demonstration included an on-the-spot making of multilith plates, and from these printing plates Haloid technicians ran off souvenirs for the audience.

The Xerographic process uses a photoconductive plate that corresponds to the film or paper in ordinary photography. The plate, coated with a "photoconductive insulating material," is a non-conductor of electricity in the dark, but becomes conductive when exposed to light. When the coated plate is sprayed with electrons by a simple electrical device, its surface becomes electrically charged in eight to ten seconds. In the charge condition the plate is sensitive to light.

The sensitized plate is exposed just like a photographic plate. The pattern of the image causes a latent electrical image to remain on the plate, and dry development, by flowing specially prepared powder over the plate, leaves the plate, leaves the powder attracted to charged portions of the plate, while the powder rolls off the light-affected portions. The result has been a positive, until it was shown at the PSA meeting that the process can be used to produce a positive from a negative original.

Satisfactory reproductions are possible from line negative materials such as microfilm, photocopies, Lith materials and blue prints, it has been reported.

Double-image Colorama was another Eastman Kodak display at the Detroit PSA meeting. The photo society audience saw at one instant a picture of a photographer ready with camera and subject, and the next instant, in the same 3 x 6 foot frame, they saw the color photograph taken by him.

The double image, of course, came from two pictures. In the Colorama display method the front picture, which may be a black-and-white or color print, is mounted on a perforated screen and is seen by reflection from front lights. The rear image, a transparency, is seen by transmitted light. As the front and rear lights fade in and out, the front and rear pictures are seen alternately. The perforated print and the transparency are laminated together to make the double-image presentation. Perforations are made in such a way that they are relatively invisible from a short distance away.

In the display for the PSA audience the pictures shown were of a cameraman photographing a drum majorette, and a full-color transparency of the majorette strutting her stuff. The new Colorama is already in use as in advertising displays, and other applications in advertising, sales presentation, and industrial training are expected.

Music from a photo-electric organ was the final event in the showing of the many recent photographic inventions and developments from industrial and Air Force research for the PSA members. The ingenious Baldwin organ utilizes light passing through photographic discs to obtain virtually unlimited tonal variety. It was played by Don Miller, well-known theater organist in the Detroit area.

Baldwin scientists turned to the photo-electric principle as an idea source for the development of organ tones because of its basic simplicity and because of the ease of reproducing photo-electric sound tracks once they have been obtained. The scientists designed a new shutter system and tone synthesizer and worked out a complicated system for accurate and speedy reproduction of tone colors to make the new musical instrument possible.

In the new organ, a light source is directed from the bottom of the tone generator to a photocell. Between the light sources and the photocell are two transparent discs—one rotating and one stationary—and a shutter mechanism. The rotating disc produces pitch. It has photographically reproduced on its surface a series of slots in circular patterns, one series for each note on the kayboard.

When the disc rotates, the light beam directed at it strikes the moving slots and establishes the pitch (or frequency) by the number of times it is permitted to pass through the disc per second. Light passing through 440 times per second, for example, gives pitch that will be the A above middle C.

While the rotating disc provides

(*Continued on page* 72, *col.* 1)

German crowd, part of the 1,250,000 from East and West Berlin, sees a typical RCA television program.

"Freedom's window in the Iron Curtain"

You've read the story of last summer's TV demonstrations in Berlin. It attracted a million and a quarter Germans—including thousands who slipped through the Iron Curtain to see Western progress at work.

Behind this is another story: How RCA engineers and technicians broke all records in setting up these Berlin facilities. The project called for a TV station and studio, a lofty batwing antenna, and the installation of 110 television receivers at strategic points. Such a program would normally take several months to complete. It was installed and put to work by RCA in a record-breaking 85 hours!

Programs witnessed by Berliners included live talent shows, sports events, news commentaries, and dramatizations of the Marshall Plan. Observers pronounced reception fully up to American standards—another impressive demonstration of democracy's technical ingenuity and leadership.

* * *

See the latest wonders of radio, television, and electronics at RCA Exhibition Hall, 36 West 49th St., New York. Admission is free. Radio Corporation of America, RCA Building, Radio City, N. Y. 20, N. Y.

Part of the 401 cases of RCA equipment shipped to Berlin for television demonstrations.

RCA

RADIO CORPORATION of AMERICA

World Leader in Radio—First in Television

Exhibits at PSA Meet

(*Continued from page* 70)

pitch, the actual tone qualities are added by making the light beam pass first through a stationary disc on which specific organ tone color patterns have been photographically reproduced.

When the light beam passes through the combination of discs, one moving and the other stationary, it is transformed into an interrupted beam of varied intensity. The beam then strikes the photocell at the top of the generator and produces an electrical signal of proper frequency and shape to deevlop the desired pitch and tone color. The audible organ tone is produced when the special current passes from the photocell through an amplifier to a loud speaker.

Dawson To 1908th AACS Wing

Major William S. Dawson, USAF, was recently assigned deputy director of plans and requirements of Hq, 1808th AACS Wing now in Tokyo. He had previously been C.O. of the 1951st AACS Squadron, also at Tokyo, which provides airways communications and electronic navigational facilities in central Honshu.

During World War II Major Dawson was wing staff operations officer of the 4th AACS Wing which covered the CBI Theater. Earlier in the war, while assigned to Hq, AAF, Air Weather Wing and AACS, he participated in the installation and supervision of the first world-wide weather communications system.

Westphal to AACS

(*Continued from page* 58)

vember 15 became director of engineering of the Airways and Air Communications Service which has its headquarters at Andrews AFB near Washington. He was succeeded at the directorate of communications, of which Major General Raymond C. Maude is the chief, by Colonel G. W. Wildes who had served as head of the systems division's operations branch since November 1949.

During his tenure as chief of the systems division Colonel Westphal had direct responsibility for the huge expansion and modernization of the Air Force's communications facilities throughout the world. This included the automatically switched teleprinter system in the continental United States which was developed and installed by the Western Union Telegraph Company.

Col. Wildes began his military service as a second lieutenant of infantry in 1935 after his graduation from Virginia Polytech. He transferred to the Signal Corps in 1941, and to the Air Force in 1944 as a communications officer. From 1945 to 1946 he was communications operations officer with the Far Eastern Air Force which included duty at Guam, Manila, and Tokyo.

Upon his return to the U.S., Col. Wildes for a year was in communications operations duties with the Strategic Air Command at Andrews AFB. The following two years he served as chief of the joint communications center of the Alaskan Command, and later as secretary of the joint staff on communications with the Far Eastern Air Force.

Col. Westphal had a lengthy career with the New Jersey Bell Telephone Co., beginning with his graduation from the University of Pennsylvania in 1926, before entering military service prior to World War II. He was called to active duty in March, 1941, as a captain in the Signal Corps. After serving with the Air Force antisubmarine command and the directorate of Air Force communications, he was appointed telecommunications officer of the Mediterranean Allied Air Forces. Returning to the U.S. he attended the Air Force School of Applied Tactics at Orlando, Fla. In 1946 he returned to New Jersey Bell, and about a year later, upon accepting a commission in the regular Air Force he was assigned to the directorate of Air Force communications. He was promated to the post of chief of the communications systems division in the directorate in August 1949.

Marks To Be Honored

William S. Marks, Jr., chief engineer of Coles Signal Laboratory, has been notified by the Institute of Radio Engineers that its board of directors have chosen him for a Fellowship Award, IRE's highest membership grade. Mr. Marks has made outstanding contributions to radio engineering and allied fields. The award with citations will be presented at IRE's annual banquet to be held in the Waldorf-Astoria on the evening of March 5, 1952.

New Essential to Sea Victory

(*Continued from page* 13)

operating the equipment. Ship's force and yard personnel took turns watching the gear. When it failed the shipyard engineers made repairs as rapidly as possible and turned it back on. Needless to say this program was a big success. To prove optimum operation the services of aircraft and a surface ship were arranged and all equipment was checked out and given final adjustments. No significant casualties to any electronic equipment followed departure from the shipyard, and the submarine was able to give the yard a well-earned pat on the back.

In the field of design much is now being done to keep the future technician from unnecessary lost motion. Here is a vital spot. If we have complex gear that we cannot keep operating, we would be better off without it —so that we could use the space for a few more rubber life rafts.

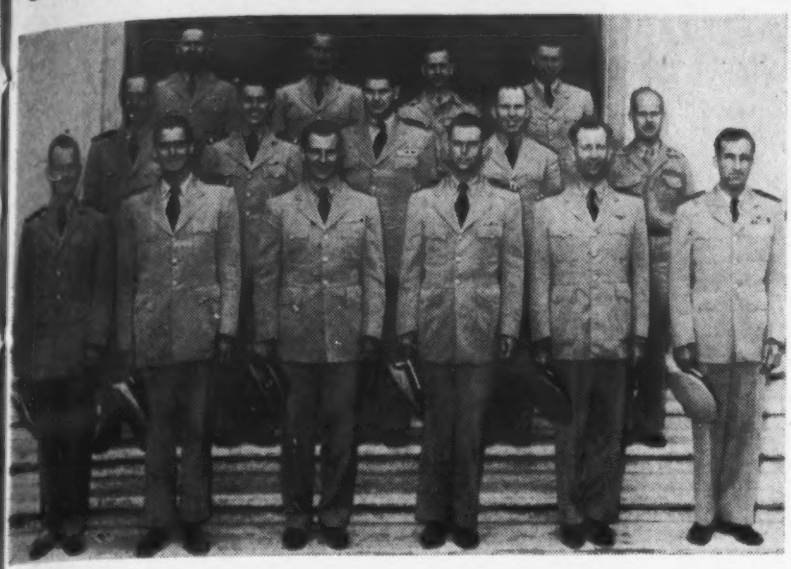
Components are the bane of the technician's existence today, the lack of them and their short service life. Redesign of components as to size, life, and susceptibility to mass production is receiving much attention. These requirements are often conflicting. Specifications must be drawn with the utmost care. Essential failure data must be provided by the operating forces. Rather than the voluntary submission now relied upon, the report should be made rigidly obligatory. It is absolutely necessary that complete data be collected and analyzed. The only way to do it is to rely on command, the military way. The technician will not fill out a form that takes only one second of his time for some distant and vague bureau if his commanding officer is not concerned with it and wants the equipment fixed. And he will continue to be needed to fix the equipment all of the time until he gets new components. Instead of asking the technician for the information, we should ask the commanding officer. We should clearly inform the commanding officer why the information is needed, and exactly what is being done with it.

Liaison with the operating forces is nowhere more important that in design work. It is difficult to see how there could be too much of it. It benefits both designer and consumer. The consumer learns what the designer has up his sleeve and what it is reasonable for him to ask for. A demand is created for hitherto unknown items. The designer is forced to come down out of the clouds and fit his schemes to the needs of the consumer. He secures direction and inspiration from the man in the field. Those primarily concerned with tactics, and even strategy, must be fully capable of incorporating new developments into their plans and even of demanding them from the designers. A knowledge of what our own designers are working on is essential to those who must wonder what the enemy's bag of tricks contains, and how to counter them.

If two world wars reemphasized any lesson, it was that of supply. Supply is closely tied to demand. Design must help support to meet the demand. The demand in peacetime, if one can call this peacetime, now frequently outstrips the supply. Economy of force in the utilization of the available funds requires that we juggle supply and demand so that we do not tie up more money than is necessary in idle parts. We must remember that successful war is the responsibility of the military man; we are not preparing for peace. We must try not to let peacetime methods and ideas lose our campaigns.

The United States Navy has many achievements in electronics of which it

Graduating Class, Communication Officers



Graduating class of the communication officers short course—Group 15C at the U.S. Naval School, general line, Monterey, California. Class graduating Oct. 26, 1951. Lert to right: Back row—LtJG J. F . Smithson; Ens. R. H. Thornton, Jr.; 1st Lt. J. W. Toomey, USMCR; Lt. W. W. Wages, Jr. Middle row—Lt. C. H. Fisher, III; G. T. Jones; LtJG J. O. Lyon; LtJG B. H. Murphree; Maj. P. H. Smith, Jr., USMCR. Front row—Ens. W. R. Barnes; Ens. H. C . Bate; LtJG F. W. Dettmer; Lt. H. F. Donaldson; Lt. Cdr. K. S. Dunwoody; LtJG E. E. Emerson.

The communication officers short course, conducted at the Monterey Navy school is a twelve-week course which convenes every four weeks. Each group includes approximately twenty officers. The course objective is "to train officers in the operational aspects of communications and qualify them for positions of responsibility in the communications organization afloat." Graduates are qualified to serve as communication officers of auxiliary types and destroyers, or as assistant communication officers of large ships and staffs.

Novice, Technician Amateurs May Join MARS

The expansion of the Military Amateur Radio System (MARS) to include in its membership Novice and Technician class radio amateurs was recently announced by the Chief Signal Officer for the Army and the Director of Communications for the Air Force. Membership in MARS ha sthus been opened to amateur radio newcomers and those interested in the technical or experimental phase rather than the purely communication or traffic handling aspects of radio.

MARS was activated in November 1948 as an organization or and for U. S. amateur radio operators who are interested in military radio communication. The ever enlarging scope of military communications demands more and more radio operators and technicians to man stations, operate equipment, make necessary repairs and keep the flow of equipment coming off the assembly lines and going to the places it is needed.

The time required totake a man with no knowledge of radio and to make a competent communicator of him is long and expensive. As in World War II, so in any future all-out conflict, the armed forces will look to the ranks of amateur radio for assistance in locating the manpower, not only for operating, but for training and advising others.

Amateurs, whether novices or old timers, who are interested in knowing more about MARS and how it operates, are invited to write one of the following:

MARS Headquarters (Army)
Office of the Chief Signal Officer
Washington 25, D. C.

MARS Headquarters (Air Force)
Director of Communications, AF
Washington 25, D. C.

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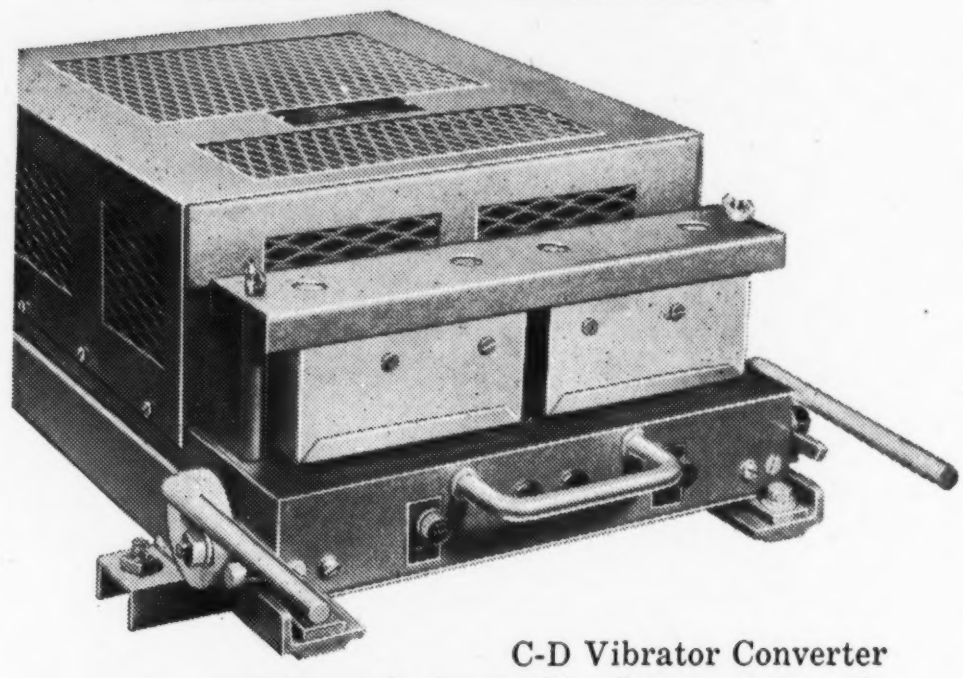

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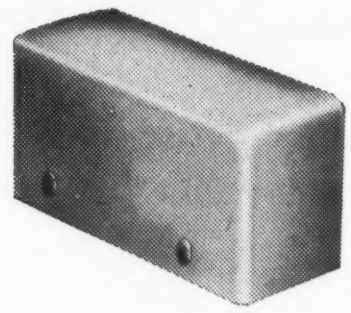

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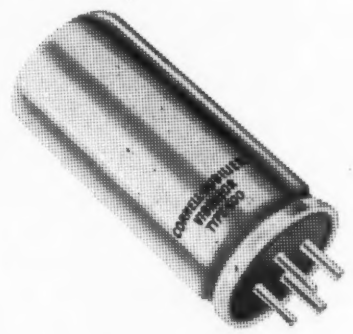

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FCDA to Rely Almost Entirely on Commercial Communications

The heaviest possible reliance on the flexibility and completeness of the nation's commercial communications facilities — backstopped by "off premise extensions" which will insure that a regional or state headquarters will remain in contact with the national system even if all toll centers in the city in which it is located are demolished—is being placed by the Federal Civil Defense Administration in communications network planning now getting solidly under way.

Concept of the system, and the effectiveness of its operation, received their first major tests November, 3, when Civil Defense Region I carried on a maneuver known as "Operation Rhode Island," a realistic civil defense exercise in which Providence, R. I., was the disaster scene.

The Federal Civil Defense Administration, with its communications operations and planning under the direction of Col. William Talbot (USAF, ret.), will rely almost exclusively on regular commercial facilities—teletypewriterex - change, voice telephone, and telegraph —to link FCDA headquarters in Washington and the state and regional offices for administrative traffic, exercises, and actual emergencies. Colonel Talbot emphasizes that the job can be handled through the regular services — with a circuit priority system for civil defense traffic when necessary—far more economically and with much greater flexibility than via a private line system or an FCDA-operated radio network.

To insure that regional and state headquarters will always be able to reach the backbone TWX network of the telephone companies, short-distance private lines will be leased from the headquarters to cities perhaps 40 or 50 miles away. Thus, for example, the Atlanta regional headquarters might have a private line to Augusta, Ga. Then, should all toll centers in Atlanta be knocked out, the regional office still would be in communication with the rest of the nation via the Augusta-Atlanta private line. From there, the elaborate networks set up by the Bell System to bypass any blocked point and reach any point in the system from any other point by alternate routing would carry the emergency message load.

The planning thus is, and has been, in keeping with the requirement contained in the first supplemental appropriations bill, passed by Congress as one of its last actions before adjournment, that the FCDA communications funds cannot be used to duplicate existing commercial facilities.

(*Continued on page* 76, *col.* 1)

Korea Assignments And Awards

Hort X Corps Signal Officer

Colonel Henry J. Hort, who activated the Signal Corps replacement training center at Camp Gordon, Ga., and was its commander until July 1951, has been appointed X Corps signal officer in Korea. Hort was president of the AFCA's Augusta-Camp Gordon Chapter in 1950 when that group won the Association's national annual contest as "Chapter of the Year."

Major Anthony J. DeAngelis, former assistant signal officer of the 25th Infantry Division, has been assigned as division signal officer of the 1st Cavalry Division in Korea. He has been in Korea almost from the beginning of the present conflict and has been awarded the Bronze Star Medal and the Korean Presidential Unit Citation while directing the signal support of the 25th Division unit.

Unit Commendations

The 51st Signal Battalion, which in nine months in Korea installed communications for 33 command posts of I Corps, was recently awarded the Meritorious Unit Commendation by Eighth Army. Its commanding officer is Lt. Col. Milton D. Weeks. The citation said in part that the 51st, under constant pressure, furnished "outstanding service in Korea in support of combat operations during the period from September 1950 through March 1951."

The 522d Signal Construction Company, the first company of its type to arrive in Korea, also recently received the Meritorious Unit Commendation for outstanding services in support of combat operations in Korea, the citation noting that the company had been assigned extremely heavy missions.

The 581st Signal Radio Relay Company was another recent recipient of the Meritorious Unit Commendation. Elements of the company participated in amphibious landings with the 1st Marine and 7th Infantry Divisions, aiding in the establishment of vital communications.

Individual Decorations

1st Lt. John A. Duncan, Signal Corps, has been awarded the Silver Star Medal for gallantry in action against the enemy in Korea. He voluntarily established a road block with elements of his company and held the road block against a series of attacks by Chinese Communists until the regiment's vehicular traffic had cleared a nearby road junction. Surrounded by that time, Lt. Duncan then led his company in a successful effort to fight their way out of the enemy trap to safety.

Corp. George W. Henderson was awarded the Bronze Star Medal for heroic achievemetn against the enemy in Korea. When his unit was pinned down by severe enemy fire he left his plaec of safety to repair a radio vehicle, which permitted his and following vehicles to continue out of the enemy trap.

STATEMENT OF THE OWNERSH MANAGEMENT, CIRCULATION, etc., quired by the act of Congress of August 2 1912, as amended by the acts of March 1933, and July 2, 1946, of SIGNAL Magazin published bi-monthly at Washington, D. C October 1, 1951.

District of Columbia }
City of Washington } ss.

Before me, a notary public, in and for t State and County aforesaid, personally a peared Wallace R. Fingal, who, having be duly sworn according to law, deposes and sa that he is the Editor of the SIGNAL Magazi and that the following is, to the best of h knowledge and belief, a true statement of th ownership and management of the aforesa publication for the date shown in the abo caption, required by the act of August 2 1912, as amended by the acts of March 1933, and July 2, 1946, to wit:

1. That the names and addresses of th publisher, editor, managing editor, and bu ness manager are:

Publisher: George P .Dixon, 1624 Eye S N. W., Washington 6, D. C.

Editor: Wallace R. Fingal, same address.

Managing Editor: Wallace R. Fingal, sam address.

2. That the owner is: (if owned by corporation, its name and address must b stated and also immediately thereunder th names and addresses of stockholders owni or holding 1 percent or more of total amou of stock. If not owned by a corporation, th names and addresses of the individual owne must be given. If owned by a partnership other unincorporated firm, its name and a dress, as well as that of each individual me ber, must be given.)

Armed Forces Communications Associatio 1624 Eye Street, N. W., Washington 6, D.

3. That the known bondholders, mortgage and other security holders owning or holdi 1 percent or more of total amount of bond mortgages, or other securities are:

None.

4. That paragraphs 2 and 3 include, cases where the stockholder or security hold appears upon the books of the company trustee or in any other fiduciary relation, th name of the person or corporation for wh such trustee is acting; also that the sta ments in the two paragraphs show the affian full knowledge and belief as to the circu stances and conditions under which stockho ers and security holders who do not appe upon the books of the company as truste hold stock and securities in a capacity oth than that of a bona fide owner.

WALLACE R. FINGAL,
Editor.

Sworn to and subscribed before me th 2nd day of October, 1951.

Seal SARAH M. VARDY,
Notary Public.

(My commission expires 14 August 195

Brown Named Temco Sales Manage

Brite Heads Research-Development

The appointments of Walter Birds Brown as sales manager, and Leigh Brite as director of research and develo ment for the Transmitter Equipment Man facturing Co., Inc., have been announce by Morton B. Kahn, president of the firm Brown will divide his time between th company's factory and main office in Ne York, and its branch office in Washingto D. C., since the company has large co tracts with the armed forces for the pr duction of complex electronic devices.

Mr. Brite was recently chief electroni engineer of the U. S. Air Force Securi Service, Brooks Field, Texas, and previou ly was with the Army Security Agency a the National Bureau of Standards.

A former Signal Corps officer and a v eran of both World Wars, Col. Brown h had extensive experience in the sales a industrial relations fields. Before joini Temco he was with the National Associ tion of Manufacturers. He is chairman the membership committee of the AFCA Washington, D. C. Chapter.

VULCAN NEEDED AN ANVIL...

But Philco forged a mighty weapon with a change of name! When the Armed Forces needed vast quantities of Microwave Radio Relay equipment, Philco's standard commercial product met the exacting requirements without change! Philco *Advanced Design* Microwave already contained JAN-approved components and military type plug-in assemblies. So with only the change of name from Philco *Advanced Design* Microwave to AN/TRC-30, it was ready for military use.

Philco Microwave equipment is designed for utmost reliability, flexibility and ease of maintenance... qualities demanded without compromise by the Armed Forces. Philco's ability to surpass these rigid standards provided the Armed Forces with an immediate source of vital communications equipment.

Today, as always, forward-thinking Philco stands ready to develop and produce advanced electronics equipment to meet any need of the Government and the Armed Forces.

PHILCO Famous for QUALITY the World Over

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GOVERNMENT AND INDUSTRIAL DIVISION

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Still not finally decided was the exact amount of funds on which the FCDA warning and communications division will operate for the remainder of the 1952 fiscal year, ending next June 30. Although the House-passed funds bill called for $3 million for the communications operations, and the Senate measure provided for more than $4 million, it was understood last week that the tentative allocation to the warning and communications division is in the area of $2.8 million. This is not definite, however, as the appropriation bill which came out of the joint House-Senate conference did not specify anything but an overall amount for FCDA operations, and the agency's budget officials have not come up with final allocations.

Also available to FCDA is $1.5 million to match, on a dollar-for-dollar basis, funds expended by the states for communications equipment.

Electronics 1952 Outlook

Military requirements for electronics equipment and the civilian outlook for 1952 — particularly with reference to what may be expected if the FCC "freeze" on new television stations is lifted—were outlined for members of the Radio-Television Manufacturers' Association's transmitter division during a panel discussion which featured an all-day meeting of the group in Washington Nov. 1.

E. T. Morris, Jr., director of the National Production Authority's electronics division; Curtis B. Plummer, chief of the FCC Broadcast Bureau; Col. C. A. Poutre, director of the Munitions Board's office of electronics programs; and Frederick R. Lack, past president of the AFCA and Western Electric Co. vice president and chairman of the Munition Board electronics industry advisory committee, were the speakers at the panel session which preceded a concluding dinner-meeting at which Rear Adm. John R. Redman, director of communication-electronics, Joint Chiefs of Staff, discussed some of the military's problems as far as electronics is concerned. Admiral Redman proposed joint development and procurement specifications to aid the manufacturers.

With military requirements necessarily outlined in brief fashion by Colonel Poutre because of miiltary security, discussion of the end of the FCC TV "freeze" by Mr. Plummer, who presented a possible schedule leading up to new stations beginning operations, and how the end of the freeze could affect the industry, as seen by Mr. Morris, aroused the interest of the panel audience.

50th Anniversary of Marconi's First Trans-Atlantic Signal

The fiftieth anniversary of Marconi's first spanning of the Atlantic by wireless was marked on December 12 this year. The then amazing feat of young Guglielmo Marconi occurred only four years after he had demonstrated to doubting British G.P.O. authorities that it was possible to pass intelligence between two places only a few yards apart using only the ether as a medium.

When Marconi, and the earliest members of the company he founded, Marconi's Wireless Telegraph Co., Ltd., decided that the radiation of wireless waves was not limited to short ranges but could be propagated over long distances, they decided to prove the theory by sending signals from England to Newfoundland. Marconi was faced again with derision and disbelief, but his confidence, and that of his two colleagues, Kemp and Paget, never weakened.

On the page of his diary marked December 12th, 1901, young Marconi wrote "Sigs. at 12:30, 1:10, and 2:20," for at those times on that day he had heard three dots, for the letter S in the Morse Code, and he knew that on the other side of the Atlantic his colleagues had been responsible for putting those signals into the ether. The first wireless signals had been transmitted across the Atlantic and a new era in communications had begun.

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American Cancer Society

Commercial Communications

(*Continued from page* 26)

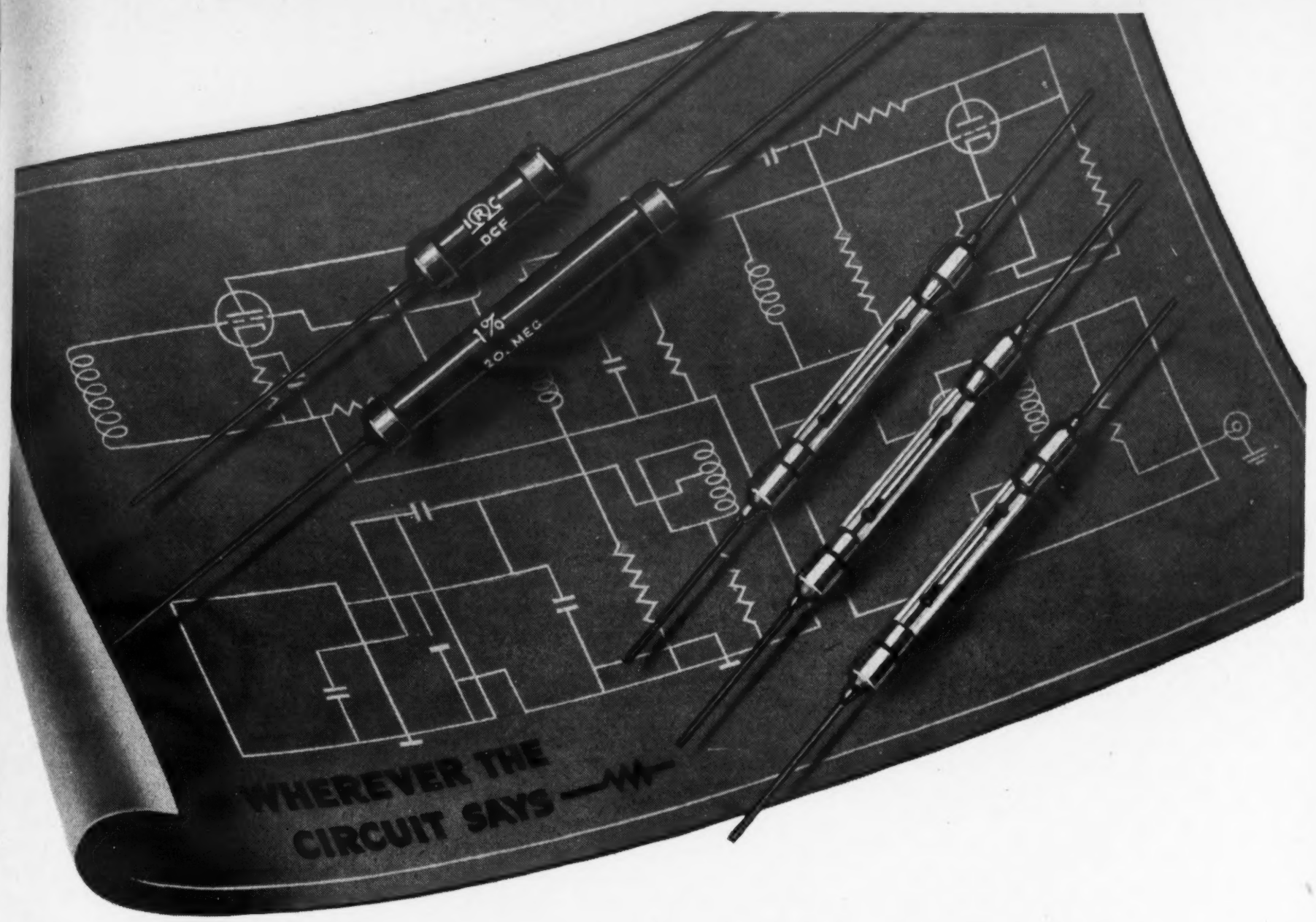
fication, audio amplification, mixing, oscillators, diode and triode detectors and the like. It will be well worth the effort spent if a tube that is highly rugged and reproducible as well as flexible in application results.

There is another promising development on the horizon which may contribute substantially toward improvement of reliability though it is still a little early to talk much about it. This is the application of semi-conductors to rectification, detection and amplification. With the development of the junction type germanium triode there is justification for increased optimism. The full possibilities of such applications can be realized, however, only through the willingness to develop circuit techniques which will humor these new tools. As a matter of fact, I suspect that in our efforts to utilize solid state devices most effectively, we may awaken to the fact that there are also many things that can be done with a good grounded type triode that we have never seriously investigated before because of the availability of multielement tubes that still have their excellent points but which, nevertheless, may not contribute to circuit reliability.

It will bear repeating that lack of reliability in electron tubes is both a cause and an effect of poor system reliability. A better knowledge of the almost human vagaries of a given population of tubes, the probabilities of failure and the need for factors of safety in design will all pay good dividends in equipment reliability. We must all make a concerted effort to make the best possible selection and the best use of available tubes while striving to simplify and improve tube designs and to use such new tubes with due allowance for safety factor.

The panel on electron tubes of the Research and Development Board has gotten under way a project of considerable magnitude to investigate the many factors involved in reliability of electronic systems and to determine the most effective action to be taken. We hope that in the not too distant future we will not be talking of reliable electronic equipment and components. Such reliability will be taken for granted as it is in steel beams and similar things.

While this is being done, our efforts should be redoubled to design tubes which will eliminate known weaknesses. This can be done most effectively through close cooperation with set designers whose ingenuity is employed to work out designs requiring the minimum number of basic elements and here again I suggest real consideration be given to the wider application of grounded grid type triodes.



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New IRC Type UHR (Ultra High Resistance) Resistors actually provide resistance values of 10^8 to 10^{12} ohms inclusive! High resistance and small size make them suitable for use in such critical applications as atomic research instrumentation. Hermetically sealed in inert gas in glass tubes, the new UHR's are protected from mechanical damage and exposure to atmospheric conditions. Tolerances: ±10% standard, ±5% and labeled to within ±1% of actual value at additional cost

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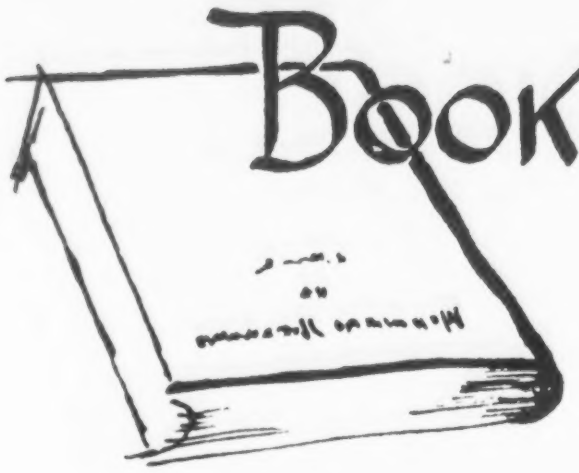

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Frank Martins, Mgr.

National Best Sellers

As listed in Publisher's Weekly for September 1, 1951

FICTION

1.	The Caine Mutiny, *by Herman Wouk*	$3.95
2.	The Cruel Sea, *by Nicholas Monsarrat*	$4.00
3.	Melville Goodwin, USA, *by John P. Marquand*	$3.75
4.	Moses, *by Sholem Asch*	$3.75
5.	The President's Lady, *Irving Stone*	$3.50

NON-FICTION

1.	The Sea Around Us, *by Rachel L. Carson*	$3.50
2.	The Forrestal Diaries, *Ed by Walter Millis and E. S. Duffield*	
3.	Kon-Tiki, *by Thor Heyerdahl*	$4.00
4.	Washington Confidential, *Jack Lait and Lee Mortimer*	$3.00
5.	Dizzy, *by Hesketh Pearson*	$4.00

FICTION

1.	The Holy Sinner, *by Thomas Mann*	$3.50
2.	Requiem For A Nun, *by William Faulkner*	$3.00
3.	The Blessing, *by Nancy Mitford*	$3.00
4.	The Duke's Daughter, *by Angela Thirkell*	$3.50
5.	Woman At The Window, *by Nelia Gardner White*	$3.50

Candidates for the List

NON-FICTION

1.	A Man Called Peter, *by Katherine Marshall*	$3.50
2.	Better Homes and Gardens Handyman's Book	$3.95
3.	The Story of the *New York Times*, *by Meyer Berger*	$5.00
4.	Life in America, *by Marshall B. Davidson*	$20.00
5.	Schnozzola, *by Gene Fowler*	$3.00

STRANGE LANDS AND FRIENDLY PEOPLE. By William O. Douglas. Harper & Brothers. $4.

Because of the increasing strategic importance of the general area below Russia, Justice Douglas, account of his 1949 and 1950 tours of that area should be of decided interest to all who attempt to keep abreast of worldwide developments in the present communist threat. It could be simply said, without limiting the book's appeal to students of international affairs, that the book is decidedly interesting.

In his two summer trips to Iran and Iraq, Israel, Syria, Lebanon, Jordan, Greece and Cyprus, and India, Justice Douglas was not content to be one of those who think they can understand a country by sitting in its capitals and other prinicipal cities talking to its "bigshots." Everywhere in his journeys through the Moslem world he went off the beaten path to talk to "the tribesmen, farmers, goatherders, villagers, woodcutters, shopkeepers, who constitute the hard centrol core of each of these countries." He was not just another rush-rush tourist who forms an opinion of a country based on riding through it. Readers will not that the Supreme Court Justice never was in such a hurry that he couldn't stop to talk long and intimately with every manner of man in those areas close to the cradle of civilization and so near to modern threats to civilization.

He saw the backwardness of the Arab world, along with the efforts of a few enlightened leaders to bring progress into Biblical surroundings. In Israel he saw what a determined nation could do to conquer the lack of water, the ravaes of the soil erosion, the pressures of population on the arid land. He was intrigued with India. Iran fascinated him—especially the tribes that make up about one-fourth of Iran's population. He admired their sturdiness and self-reliance, their love of freedom characteristic of mountain peoples everywhere.

Out of his travels in the Middle East, Justice Douglas has come to the view that communism is not directly responsible for the present troubles of the Moslem world. He insists that the root causes of the discontentment are poverty, ignorance, misgovernment, and a vicious system of land tenancy. These evil conditions the Justice found being exploited by communists, and he warns that they will go on exploiting them until we and our friends do something to correct them.

For all the thought-stirring and often disturbing reflections it causes, the book is as vastly entertaining and instructive as the thousands of varied miles and modes it covers. As a reporter, or as a judge, Justice Douglas understandingly sets forth political, economic, and religious factors, and deftly, graphically describes the lands and people he saw on his friendly journeys.

LEGEND INTO HISTORY, The Custer Mystery. By Charles Kuhlman. The Stackpole Company. $5

The defeat and extermination, to the last man, of the 225 officers and men of the five troops of the 7th Cavalry who rode with Custer into the jaws of death on the bluffs of Montana's Little Big Horn, on June 25, 1876, has been one of the most tragic and altogether baffling episodes in American history. Innumerable accounts, many of them lurid and irresponsible, have appeared in the years since the famed "last stand." Survivors of other troops of the regiment who were in related actions have been quoted, official reports reprinted, the stories of Indians who fought in the battle recounted.

The facts are irrefutable, but Mr. Kuhlman in his book appears to have made the first serious attempt to reconstruct objectively, and without bias, the successive movements of the several elements of the Custer command to give a "tri-dimensional" picture—with careful attention to the three elements of time, space, and topography.

Upon a visit to the battlefield sixteen years ago, the author, one-time history instructor at the University of Nebraska, became determined to find a solution to the Custer mystery. In his own words, "here was something so intriguing, so completely senseless, according to what the markers seemed to show, that I simply *had* to find the answers. My mind was monopolized by those headstones. Battle tactics always had a strange fascination for me. How much more, then, a battle you have to reconstruct from headstones and the topography, with only skimpy passages of oral evidence to help you."

So for sixteen years, Mr. Kuhlman reconstructed the battle of the Little Big Horn by the painfully slow but sound process of assembling and analyzing every bit of evidence, subjecting each minute particle to the acid test of truth, or the laws of probability, and weighing each item objectively and without personal bias or partisanship. Many challenging questions came under scrutiny, such as . . .

Would the disaster have occurred if Custer had not divided his force, resulting in defeat in detail, or was he following sound military procedure in advancing on a broad front until he could determine the strength, dispositions, and intentions of the enemy?

Why did Reno, after his disastrous fight in the valley and retreat to the high ground east of the river, lose command of the situation and fail to exercise the leadership so necessary at such a critical moment?

Did Custer see the rest of his regiment on Wier Point and believe they were on the way to join him on Custer Field in time to forestall the overwhelming rush of the Indian warriors?

The reader must judge for himself how well the author has fitted the pieces together. Whatever the verdict, his book

represents a new approach to the solution of the mystery which has caused endless speculation ever since the tragedy. Its tense drama will hold the reader from start to finish.

Every phase of the engagement, with the author's interpretation of what actually transpired, is reproduced in meticulous detail on specially drawn maps, an overall map of the battle area being contained in a pocket inside the back cover.

CROSS-CHANNEL ATTACK. By Gordon A. Harrison, Office of the Chief of Military History, Department of the Army. Government Printing Office. $5.25.

"You will enter the continent of Europe . . . undertake operations aimed at the heart of Germany . . ." This was the task given to General Eisenhower upon his selection as Supreme Allied Commander in December 1943. Six months later the U. S. First Army and the British Second Army "entered."

How this greatest amphibious operation in history was conceived, developed, took shape, and was delivered against the Germans is told in *Cross-Channel Attack*, official Army history of the Allied invasion of Western Europe in 1944.

To create the plan to invade Europe from British bases, and to assemble, organize, equip, and convey an invasion force to Normandy, literally hundreds of planners labored more than two years. Problems complex and petty had to be worked out; long studies had to be made of the enemy-held coast, and searches conducted for adequate equipment. One such search—for landing craft—extended around the globe. Emphasizing the role of the planners who blueprinted the invasion, the author states that the Normandy assault was "as thoroughly planned as any battle in the history of war."

After unfolding the grand scheme of the designers of the operation, Dr. Harrison depicts the actual scenes of the invasion when "the great names" dropped out of the story to be replaced by names of combat commanders and their troops who gained the beachheads, and who sustained the drive of the operation until the fall of Cherbourg, where the narrative ends.

In a foreword to the book, Maj. Gen. Orlando Ward, chief of military history of the Army, states that in preparing the narrative the author searched an impressive bulk of German as well as Allied documents, including interviews with combatants, and that in this book much of the material appears for the first time. By thus interweaving enemy plans and operations with those of the Allied. Dr. Harrison has been able to present the first integrated account of the invasion as seen from both sides of the Channel.

Cross-Channel Attack is the seventh book to be released by the Army in its projected 90-volume history of World War II being prepared by the office of military history. Combat volumes published earlier were *Okinawa, Guadalcanal,* and *The Lorraine Campaign.*

WASHINGTON COMMAND POST, The Operations Division. By Dr. Ray S. Cline, Office of the Chief of Military History, Department of the Army. Government Printing Office. $3.25.

Like *Cross-Channel Attack*, this is another completed volume of the 90 which are planned to make up the U. S. Army's official World War II history. Unlike *Cross-Channel*, it is not a combat volume, but tells how the Army planners "operated."

The multi-front that developed early in World War II changed the earlier concept of fighting on only one front, as in World War I, and made necessary the creation of a centrally located staff to plan all worldwide operations of the Army and direct and coordinate them. And so the Operations Division was created early in 1942 during the reorganization of the Army.

Legends quickly grew around OPD, as it was popularly known, because of its vast influence as the Washington Command Post of General George C. Marshall through which he exercised overall command of the Army. Direc-

(*Continued on next page, col.* 2)

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New Essential for Victory

(*Continued from page 72, col. 3*)

may be proud. We are today ahead of every other nation in our applications of electronics to naval use. It would be folly to rest now, and we will not do so. What vast new fields electronics will open to us in the next hundred years none can predict with certainty. If the naval officer of 2050 does not, however, look upon many of us with the same indulgence with which we now regard the sailpower captain of 1850, it will be surprising. That we could fail to appreciate the great tools we have and fail to strive with all of our energy to master them, is evidence of the inherent conservatism of the human being. That we are doing far better with our new science than our forebears were doing a century ago may indicate that man is learning something after all.

A great educational job, even a missionary job, remains to be done within the naval service. The aim must be to place electronics on the level of importance in the line officer's heart and mind with time-honored seamanship, ordnance, and engineering. Within the memory of living man this missionary work was being conducted for engineering. Today the engineer is not the object of sly mirth or of the wise tolerance of the ignorant. The captain of a man-of-war of 1850 would be amazed to find the once lowly engineer envied and respected in 1950. History will repeat itself.

One if by Land

(*Continued from page 19*)

picked up the wire they had laid before pulling out just before Christmas.

Back in South Korea again the battalion moved up the peninsula once more. The communications they have provided, in support of the all-out U.N. drive, has caused General Almond to hail the 4th Signal Battalion as "a splendid credit to a long history of Signal Corps service." Seldom if ever, said the general, "has a signal unit faced the hardships of the 4th. But in every instance they have 'got the message through'; they have played a key role in the X Corps operations of the Korean war."

To record the activities of the corps for newspapers and historical reports, the battalion's photographers have braved icy trails, mined roads, and enemy fire. Armed with Speed Graphics, Kardons and a Bell and Howell Eyemo, they have given the American people a picture of the war which can be viewed from the security of the living room.

Many of the men in the battalion will one day return to allied civilian jobs. With them they will take the experience and courage that will continue to serve America with the finest in communications, electronics and photography.

Our motto has been maintained.

INDEX TO ADVERTISERS

(Advertising Agency Shown with Advertisers)

Amercian Chemical Paint Company — *May Advertising, Inc.* 67
American Lava Corporation — *Power & Condon* 41
Arma Corporation — *Doyle, Kitchen & McCormick, Inc.* 2
Arnold Engineering Company — *Walker & Downing, General Agency* 39
Automatic Electric Company — *Proebsting Taylor, Inc.* 47
Breeze Corporations, Inc. — *Burke, Dowling Adams, Inc.* 57
Centralab, Division Globe-Union, Co., Inc. — *Klau-Van Pietersom-Dunlap Assoc. Inc.* ..... 4th Cover
Cornell-Dubilier Electric Corporation — *Reiss Advertising* 73
Da-Lite Screen Co., Inc. — *Scantlin & Company* 60
Delco Radio Division, General Motors Corp. — *Campbell-Ewald Company* 43
General Electric Company — *Maxon Advertising, Inc.* 6
Gray Manufacturing Company — *Erwin, Wasey & Company, Inc.* 53
Hallicrafters Company, The — *Sorensen & Company* 63
Haloid Company, The — *Hutchins Advertising Co.* 61
Hoffman Radio Corporation — *Walter McCreery, Inc.* 51
International Resistance Company — *John Falkner Arndt & Co., Inc.* 77
International Telephone & Telegraph — *J. M. Mathes, Inc.* 69
Jensen Manufacturing Company — *Burton Browne Advertising* 73
Kellogg Switchboard & Supply Company — *Glenn-Jordan-Stoetzel, Inc.* 45
Leich Sales Corporation — *Armstrong Advertising Agency* 7
Magnecord Inc. — *Arthur Towell, Inc.* 65
Philco Corporation — *Julian G. Pollack Co.* 75
Radio Corporation of America — *J. Walter Thompson Co.* 4, 5, 71
Radiomarine Corporation of America — *J. Walter Thompson Co.* 8
Radio Materials Corporation — *Turner Advertising Agency* 59
Ray-O-Vac Company — *McCann-Erickson, Inc.* 64
Sperry Gyroscope Company — *Chas. Dallas Reach Co., Inc.* ..... 3rd Cover
Sylvania Electric Products Inc. — *Cecil & Presbrey Inc.* 49
Times Facsimile Corporation — *Thomas & Delehanty, Inc.* 1
Western Electric Co. — *Cunningham & Walsh, Inc.* ..... 2nd Cover
Westinghouse Electric Corporation — *Na Agency* 66

Books

(*Continued from page 79, col. 3*)

tives prepared by OPD for the chief of staff filtered down command channels to every soldier.

The story of this small and unique staff that planned and directed the Army's basic strategy during World War II is told in Dr. Cline's book. The author traces the staff from its formative days, when some military men doubted that such a staff was needed, to its days of maturity when it learned to apply, "as the British Army staffs so successfully applied," the methods of diplomacy to the development of military plans. Before the end of the war it was helping to set the pattern not only for American strategy, but by participation in international conferences, for Allied strategy as well.

It was this staff that decided that the best way to win the war was to make Europe the major theater of operations and to go on a "harrassing defensive west of Hawaii." It was this staff that first clearly set down the plan for massing American and British forces for the invasion of Europe across the Channel. It was this staff also that drew up plans for an invasion of Japan and provided for the occupation of Japan. All of the planning of the Operations Division, the author indicates, was done without reliance on the atomic bomb, whose development was known to only the three chief officers of OPD.

Into the story, the author knits the growing careers of some of the Army planners, introducing the reader to "Brigadier General" Eisenhower, "Colonel" Ridgway, and "Major" Wedemeyer, who later as field commanders carried out some of their own plans.

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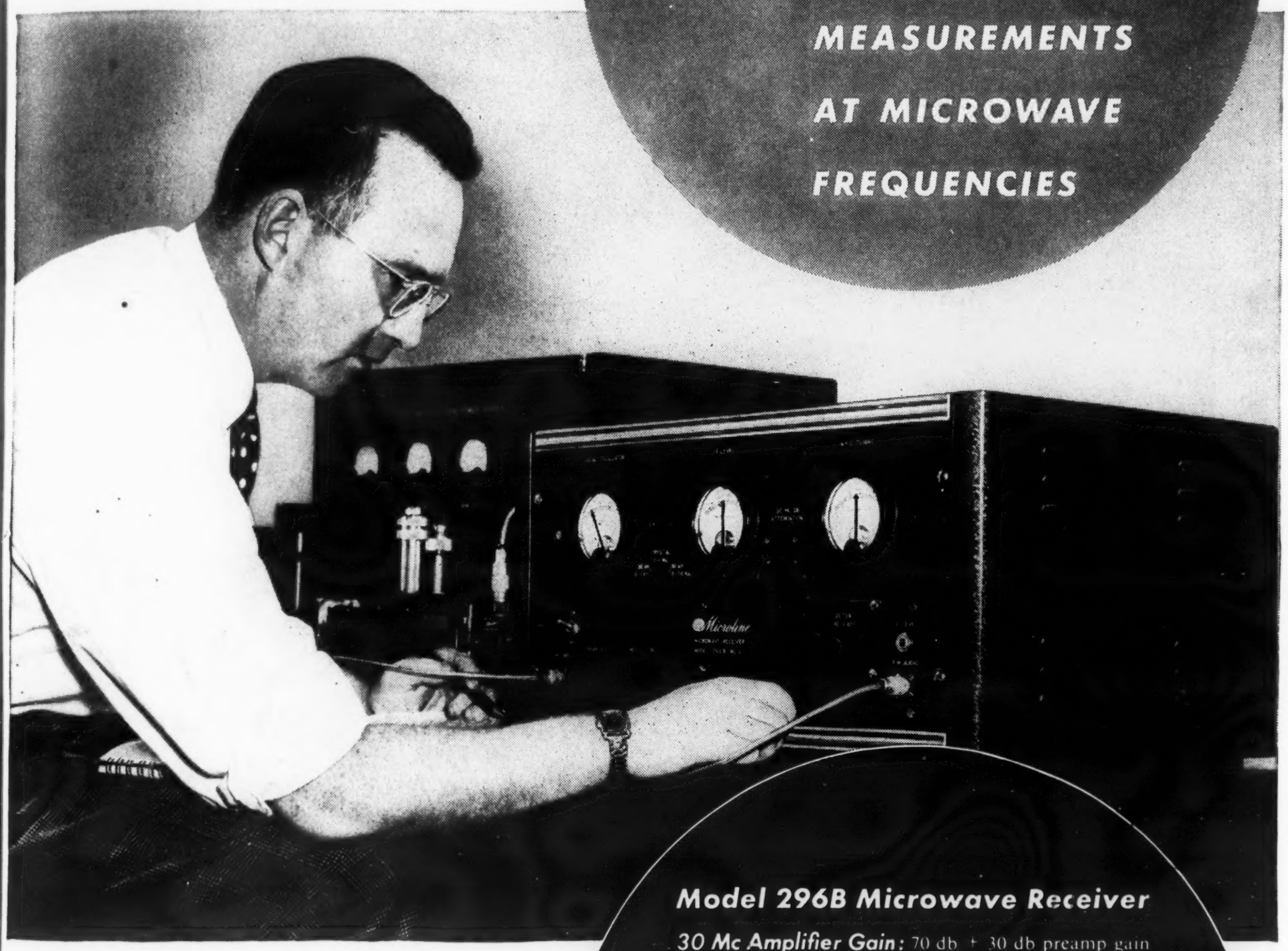

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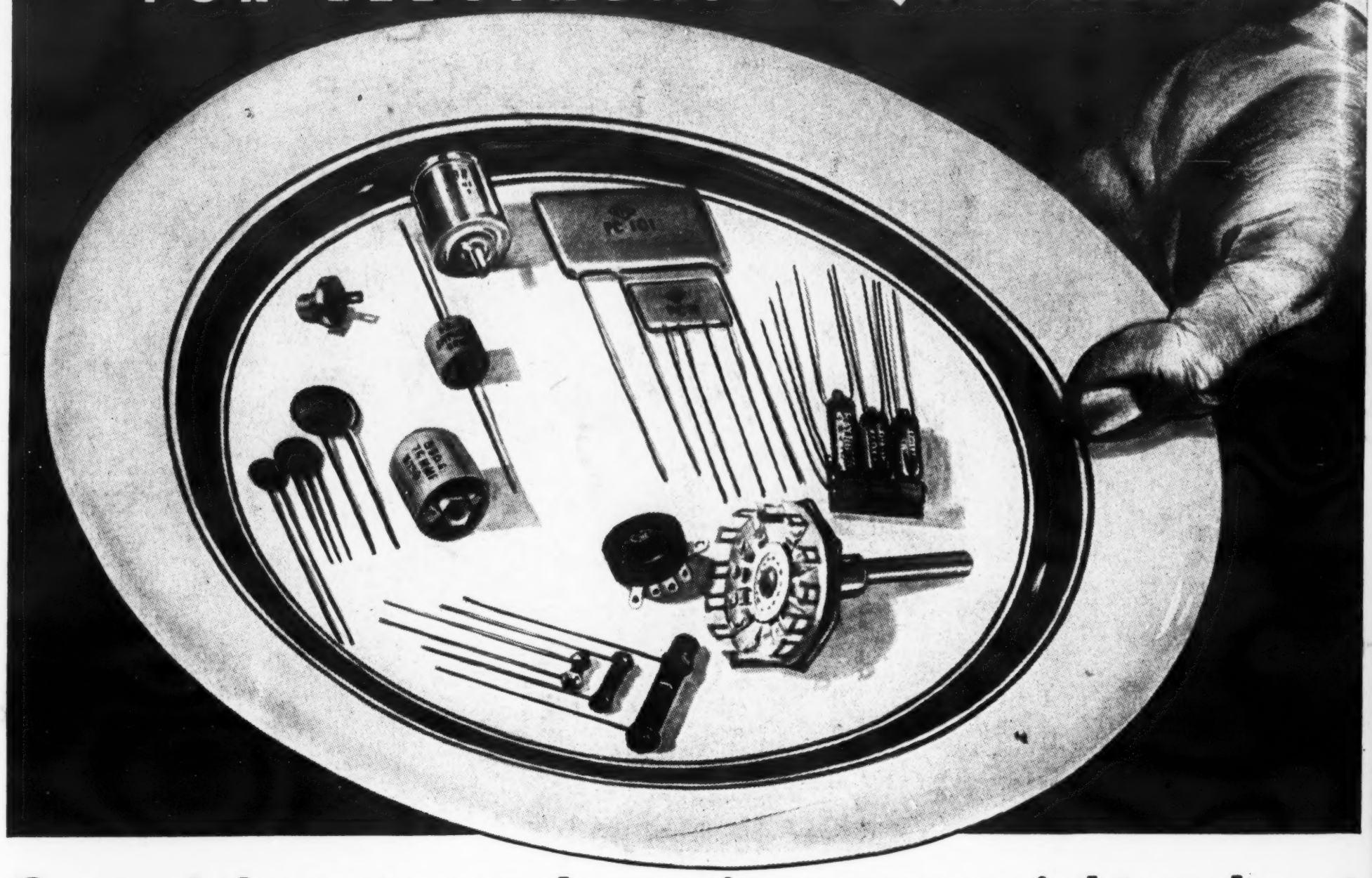

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